Environmental Impact Analysis Process

Final
Environmental Assessment
for
U.S. Air Force
Quick Reaction Launch Vehicle Program

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FINDING OF NO SIGNIFICANT IMPACT (FONSI)
U.S. AIR FORCE QUICK REACTION LAUNCH VEHICLE (QRLV) PROGRAM

Pursuant to the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), Department of Defense (DoD) Directive 5000.2-R and U.S. Air Force Instruction (AFI) 32-7061 (promulgated by 32 Code of Federal Regulations [CFR] 989), which implements these regulations through the Environmental Impact Analysis Process (EIAP), the U.S. Air Force (USAF) has prepared an Environmental Assessment (EA) of the potential environmental consequences of the USAF QRLV Program (QRLV EA). The No Action Alternative also was considered. This Finding of No Significant Impact (FONSI) summarizes the results of the evaluation.

Proposed Action and Alternatives: The attached EA is for the USAF QRLV Program, which consists of eight sub-orbital missile launches from the Kodiak Launch Complex (KLC) on Kodiak Island, Alaska. The USAF has a requirement for a QRLV Program to validate its ability to launch suborbital rockets within a relatively short preparation time (typically within 12 months of when the need is identified). Based on the DoD requirement for launching suborbital vehicles to support DoD Missions in the Alaskan Theatre, the QRLV launches will occur from KLC.

The proposed action is the USAF QRLV Program, which will consist of launching of up to eight suborbital vehicles from KLC. The project would launch one QRLV per year, beginning in 2001 and ending in 2008. The launches will be scheduled to occur between February 1 and April 30 of each year. The initial launch is proposed for March 2001.

The launches also will be used for various experiments, ranging from measuring atmospheric attributes to demonstrating new technologies. Depending on the specific mission, the QRLV suborbital launch vehicle would consist of either a single-stage vehicle or a two-stage vehicle. The single-stage vehicle would be either a Minutemen I M-56 motor

or a Minuteman II/III SR-19 motor. The two-stage vehicle would be either a Minuteman II/III SR-19/Minuteman I/II M-57 or a Delta II Castor IVB Minuteman I/II M-57.

In addition to the proposed action, the USAF considered whether other alternative sites could meet the QRLV mission requirement to support DoD activities in the Alaskan Theatre. No alternative sites are available that would meet the mission requirements of the QRLV Program.

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. If the proposed action is not conducted, demonstration of the USAF QRLV will not occur.

Anticipated Environmental Effects: The EA evaluated potential environmental effects of the USAF QRLV Program, whereby eight USAF QRLV suborbital vehicles would be launched from KLC. The construction and operation of KLC was evaluated in an EA prepared by the Federal Aviation Administration (FAA), which analyzed construction of the facility, plus at least 20 years of subsequent operations, involving up to nine orbital launches per year. The FAA EA was completed in June 1996, and a FONSI was signed by the FAA in October 1996. The FAA EA demonstrated that construction and operation of KLC would not result in significant impacts to geology and soils, water, land use, socioeconomics, environmental justice, recreation, visual and cultural resources of Kodiak Island and the KLC site.

Potential impacts specific to the processing and launch of two sub-orbital USAF *atmospheric intercept technology (ait)* test vehicles from KLC were the subject of an EA prepared by USAF in 1997 (*ait* EA). A FONSI for the *ait* EA was signed by USAF in November 1997. The *ait* EA adopted the conclusions of the previous FAA EA in regard to Geology and Soils, Water, Land Use, Socioeconomics, Environmental Justice, Recreation, Visual and Cultural Resources. The *ait* EA further demonstrated that the USAF *ait* Program would not result in significant impacts to air quality, biological

resources, noise, health and safety, or hazardous materials and waste. The USAF adopts the analysis and conclusions of the *ait* EA as they relate to the proposed QRLV Program.

In addition, the USAF conducted noise monitoring of the two *ait* launches in compliance with monitoring requirements of the National Marine Fisheries Service (NMFS). The monitoring was conducted to assess the effects of the launches on the endangered Steller sea lion (*Eumetopias jubatus*), which utilizes Ugak Island as a haulout, approximately 3 miles southeast of KLC.

Also, the University of Alaska, Anchorage, Environment and Natural Resources Institute (ENRI) conducted environmental monitoring studies of the two *ait* launches in compliance with the KLC Environmental Monitoring Plan (EMP). The ENRI monitoring was conducted to detect disturbance to Steller's eiders, Steller sea lions on Ugak Island, and impacts from rocket exhaust products on surface water and soils quality. Based on the results of the USAF and ENRI studies, the two *ait* launches did not result in significant impacts to biological or other environmental resources. The USAF incorporated the results of these studies in its assessment of potential impacts from the proposed USAF QRLV Program.

To address potential impacts specific to the USAF QRLV Program, the USAF prepared an EA that addressed the processing and launch of one suborbital vehicle per year from KLC for a period of eight years. For the proposed USAF QRLV Program, the USAF may utilize up to four different suborbital launch vehicles and configurations. The largest are the Minuteman II SR-19/Minuteman II/III M57A (QRLV-3), the same as the *ait*-1, and the Delta II Castor IVB/Minuteman I/II M-57 (QRLV-4), the same as the *ait*-2 suborbital launch vehicle. As a result, the findings of the *ait* EA as they relate to those aspects of the existing environment that could be affected by launch of the *ait* vehicles are relevant to the proposed action.

For the QRLV EA, the USAF analyzed operational changes, including use of a launch stool rather than the KLC launch pad and service structure for each launch, plus the

potential for four different splashdown points for the four QRLV vehicles. Essential Fish Habitat (EFH) also was addressed, as mandated by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (50 CFR 600.905 et seq.). EFH is defined to include the waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. The NMFS is responsible for evaluating potential impacts and enforcing the provisions of the MSFCMA. Federal agencies that fund, permit or carry out activities that may affect EFH, including Habitat Areas of Particular Concern, are required to consult with NMFS and regional Fishery Management Councils regarding potential effects on EFH. The EA concluded that impacts of the QRLV Program are not expected to result in significant impacts to EFH. As a result, the USAF is not required to engage in formal consultation with NMFS, pursuant to MSFCMA.

No specific permits or approvals are required for the QRLV Program, as it is within the parameters evaluated in the FAA EA and *ait* EA. However, USAF has coordinated with cooperating agencies, including the FAA/Office of Commercial Space Transportation, NMFS and USFWS. Further, interagency coordination is ongoing between the USAF, NMFS, FAA and USFWS on biological resources relative to the proposed QRLV Program.

Public Comment Period: A period of public comment was held from November 2 through December 1, 2000. Press releases that notified the public of the release and distribution of the Draft EA were published in the Kodiak Daily Mirror on November 2 and November 8, 2000. Press releases were provided to the Anchorage Daily News and Fairbanks News-Miner on November 20, 2000. During the public comment period, the EA was available for review at the Kodiak College Library, Kodiak High School Library and Kodiak Public Library, and on the web at the Los Angeles Air Force Base web site <http://laafb.af.mil/axf/announce.htm>. During the public comment period, nine comment letters were received from five individuals. All comments were addressed by the USAF.

Conclusion: Based on the EA, which is herein incorporated by reference, it is concluded that the Proposed Action will not result in significant environmental impacts or cause significant cumulative impacts in association with other programs. An EIS is not required. This FONSI, with the supporting EA, fulfills the requirements of NEPA, CEQ regulations, and AFI 32-7061. The point of contact for this document is Thomas Huynh, QRLV Environmental Manager, telephone (310) 363-1541 or e-mail <thomas.huynh @losangeles.af.mil>. The final FONSI and its associated EA are stored in the SMC/AXF library, 2420 Vela Way, Suite 1467, Los Angeles Air Force Base, El Segundo, California 90245-4659, as well as on the SMC/AXF web site at <http://ax.laafb.af.mil/axf/eaapgs/NEAPEA.htm>.

Monitoring and Mitigation: No significant impacts are expected to result from implementation of the proposed USAF QRLV Program. As a result, no mitigation measures are identified. Interagency coordination is ongoing with FAA, NMFS and USFWS. If requirements are identified as a result of this coordination, they will be implemented in accordance with applicable regulations. Other measures described in the USAF QRLV EA include administrative or management controls and engineered systems required by USAF and/or environmental regulations. These measures are implemented through operating procedures.

Although significant impacts to species of concern in the Narrow Cape area are not anticipated, the USAF shall coordinate with the USFWS, NMFS and other agencies, as appropriate, for launch-related monitoring. Also, monitoring will be conducted by ENRI in accordance with the AADC Environmental Monitoring Plan. The following will be monitored: Steller sea lion, Steller's eider, bald eagle (during the period of nest occupancy - late April to September) and environmental quality - focusing on surface water and soils, and launch noise.

Finding: Following a review of the attached EA, I find that the USAF QRLV Program will not result in significant environmental impacts. Therefore, an Environmental Impact

Statement is not required for the USAF QRLV Program. This document, and the supporting EA, fulfill the requirements of NEPA, CEQ, DoD and AFI 32-7061.

Approved:

William M. Wilson 26 Jan 01
Date

WILLIAM M. WILSON
Brigadier General, USAF
Vice Commander

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LIST OF ACRONYMS AND GLOSSARY OF TECHNICAL TERMS

ACRONYMS

ait	*atmospheric interceptor technology*
$A1_20_3$	aluminum oxide
AADC	Alaska Aerospace Development Corporation
AFB	U.S. Air Force base
AFI	U.S. Air Force Instruction
ASEL	A-weighted sound exposure level
AST	Administrator for Commercial Space Transportation
C	centigrade
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Cl	atomic chlorine
Cl_2	molecular chlorine
cm	centimeter
CO	carbon monoxide
dB	decibel
dBA	A-weighted sound level (in decibels)
DoD	Department of Defense
DOPAA	Description of Proposed Action and Alternatives
DOT	Department of Transportation
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Plan
ENRI	University of Alaska, Anchorage, Environment and Natural Resources Institute
EOD	Explosive Ordnance Disposal Plan
EPT	ephemeroptera, plecoptera, trichoptera (Mayflies, stoneflies, caddisflies)
F	Fahrenheit
FAA	Federal Aviation Administration
FBI	family-level biotic index
FMC	fishery management councils
FONSI	Finding of No Significant Impact
FTS	Flight Termination System
ft/s	feet per second
FY	fiscal year
GPS	Global Positioning System
HAPC	Habitat Area of Particular Concern
HCl	hydrogen chloride
IPF	Integration and Processing Facility
KLC	Kodiak Launch Complex
km	kilometer
lb	pound
LMLV	Lockheed Martin Launch Vehicle

m	meter
m/s	meters per second
ms	milliseconds
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NAWC	Naval Air Warfare Center
NAWCWPNS	Naval Air Warfare Center Weapons Division
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NOx	nitrogen oxides
NPMFC	North Pacific Marine Fisheries Council
NTW	U.S. Navy Theater-Wide Program
ODS	ozone-depleting substances
OSHA	Occupational Safety and Health Administration
PM_{10}	particulate matter (aerodiameter less than 10 microns)
ppm	parts per million
psf	pounds per square feet
PTS	permanent threshold shift
QRLV	Quick Reaction Launch Vehicle
RASA	remote area safety aircraft
REEDM	Rocket Exhaust and Effluent Dispersion Model
RV	re-entry vehicle
SMC/TEB	USAF Space and Missile Systems Center, Test and Evaluation Directorate, Launch Test Program
SPL	sound pressure level
SRM	solid rocket motor
T	launch time
TE	Transporter Erector
TM	Telemetry
TMD	Theater Missile Defense
TTS	temporary threshold shift
µPa	micropascal (unit of pressure)
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service

GLOSSARY

Abort	To end a planned missile flight before it is completed.
Air Force Instruction (AFI)	U.S. Air Force publication providing instruction.
Aloft	Winds aloft for Range Safety refers to winds in excess of 30,000 feet.
Altitude	Height above sea level.
Aluminum (Al_2O_3)	Component of rocket propellant.
Ambient	Surrounding; circulating, as "ambient air."
Ammonium perchlorate	Oxidizer for the solid rocket motor fuels.
Anatids	Ducks and geese
Apogee	Point in an orbit that is the greatest distance from the earth.
Cetacean	Whales, porpoises and dolphins are cetaceans.
EPT	A measured pollution intolerance, based on number and presence of ephemeroptera, plecoptera and trichoptera.
FBI	Family-level biotic index, a tolerance measure.
haul-out	A place usually on land or ice where marine mammals, such as seals and sea lions, groom and rest. A haul-out also can be utilized as a rookery.
micropascal	Decibel level is calculated with reference to a standard level, or µPa (unit of pressure equivalent to 1 newton per square meter). Unless otherwise specified, the reference level is 20 µPa (or 0 decibel), the minimum sound level normally heard by humans.
Pelagic species	Marine plants or animals that live or grow at or near the surface of the ocean, far from land.
Pinniped	Aquatic carnivorous mammal with finlike feet or flippers. Seals, sea lions, fur seals and walruses are pinnipeds.
Propagate	To transmit through space.
Radar	A device that determines the location of a solid object by using radio waves that "bounce" off of the object.

Range Control	The range safety organization function of controlling the flight of a rocket to ensure it stays on course.
Range Safety Program	Range function to ensure that all aspects of a missile launch and flight are done safely, including ground handling.
Redundant Airborne Command Destruct Systems	All systems on the Navy NP-3D Orion have two systems for the command destruct function. If one system goes down, the second can complete the command destruct function.
Rookery	A place where animals, such as seals and sea lions, breed and bear their young.
Second Stage	The second rocket motor to fire.
Stratosphere	The "upper atmosphere," which extends from 15 km to approximately 40 km.
Troposphere	The "lower atmosphere," which extends from the ground surface to approximately 15 km.

1.0 INTRODUCTION

1.1 BACKGROUND

This Environmental Assessment (EA) has been prepared by the United States Air Force (USAF) in support of its Quick Reaction Launch Vehicle (QRLV) Program. The QRLV Program proposes to utilize launch vehicles configured to perform suborbital missions for eight suborbital launches over a period of eight years from the Kodiak Launch Complex (KLC) on Narrow Cape, Kodiak Island, Alaska. There will be one QRLV launch per year, to occur between February 1 and April 30 of each year. The first launch will be in 2001. This proposed action will utilize a launch stool as previously used for the *atmospheric interceptor technology (ait)*-1 and *ait*-2 launches. No construction will be required.

The KLC was established by the Alaska Aerospace Development Corporation (AADC) for the specific purpose of providing a commercial alternative to launching orbital and suborbital rockets from federal installations. An EA for construction and operation of KLC was prepared for AADC by the Federal Aviation Administration (FAA) in June 1996 (FAA, 1996). The EA evaluated use of the site for up to nine launches per year over the anticipated 22 years of KLC operation.

Subsequent to the FAA EA, the USAF prepared an EA for its *ait* Program in November 1997 (USAF, 1997). The USAF *ait* Program consisted of launching two suborbital launch vehicles from KLC, *ait*-1, launched November 5, 1998, and *ait*-2, launched September 15, 1999. As of January 2001, these are the only two launches to have occurred from KLC.

Extensive environmental documentation has been prepared to address potential impacts from construction and operation of KLC. The documents shown below have been utilized in preparation of this EA:

- Environmental Assessment of the Kodiak Launch Complex, Kodiak Island, Alaska. FAA, June 1996.
- Environmental Assessment for U.S. Air Force *atmospheric interceptor technology* Program. USAF, November 1997.
- Biological Assessment: Kodiak Launch Complex. Species of Concern: Steller's Eider, Short-Tailed Albatross. ENRI, May 1998.

- Evaluation of the potential impacts of launches of the USAF atmospheric interceptor technology (*ait*) test vehicle from the Kodiak Launch Complex (KLC) on threatened and endangered species of wildlife. Launch of *ait*-1, November 5, 1998. Noise Monitoring Results. Stewart, 1999.
- Potential Impact of USAF atmospheric interceptor technology (*ait*) Launches From the Kodiak Launch Complex, Kodiak Island, Alaska. Monitoring of Noise Levels During the Launch of *ait*-2, September 15, 1999. Bowles, 2000.

1.2 MONITORING REQUIREMENTS

Compliance with an Environmental Monitoring Program (EMP) is part of the AADC launch license for KLC. Monitoring has been conducted to date (for *ait*-1 and *ait*-2) by the University of Alaska, Anchorage, Environment and Natural Resources Institute (ENRI) as a requirement of the license. In addition, the USAF monitors its own launches, per coordination with the National Marine Fisheries Service (NMFS). Based on a letter from the FAA to the AADC (see Appendix A), requirements of the EMP may change in the future. As necessary, the USAF would adjust its program to comply with potential change(s) to the EMP.

As indicated above, USAF has had separate monitoring requirements, developed in coordination with NMFS. In compliance with those requirements, USAF conducted noise monitoring of the two *ait* launches. The monitoring was conducted primarily to assess the effects of the launches on the endangered Steller sea lion (*Eumetopias jubatus*), which utilizes Ugak Island as a haulout, approximately 3 miles southeast of KLC. In addition, ENRI prepared a Biological Assessment of the threatened Steller's eider (*Polysticta stelleri*) and endangered short-tailed albatross (*Phoebastria [=Diomedea*] *albatrus*). The primary concern for the Steller's eider was disturbance from rocket motor noise in its wintering/feeding areas in the vicinity of Narrow Cape. For the short-tailed albatross, the area of interest was between 3 and 200 miles from U.S. shores. The primary concern for this species was the effect of noise from sonic booms.

1.3 NEED AND PURPOSE FOR THE PROPOSED ACTION

The USAF has a requirement for a QRLV Program to validate its ability to launch suborbital launch vehicles within a relatively short preparation time (typically within 12 months of the need

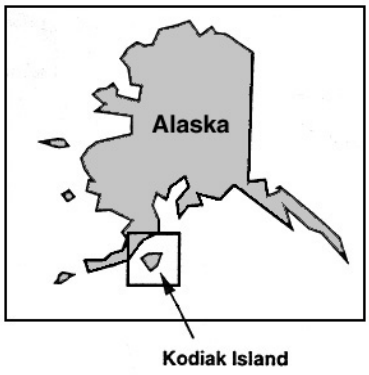
being identified). Based on the Department of Defense (DoD) requirement for launching suborbital vehicles to support DoD missions in the Alaskan Theatre, the QRLV launches will occur from KLC (see Figure 1-1).

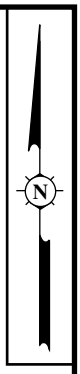
The primary objective of the QRLV launches is to provide realistic Theater Ballistic Missile scenarios in support of military exercises in the Alaskan Theater. The Alaskan Command (ALCOM), a joint DoD command, will utilize the launches to exercise Ballistic Missile Warning and Battle Management, Command, Control and Communications (BMC^3) capabilities, test planning scenarios, and execute defensive strategies during actual ballistic missile flights. The only military exercise in the Alaskan Theater with the necessary resources and infrastructure able to meet the stated objective is the annual ALCOM Northern Edge Joint-Service training exercise.

As secondary objectives, the first QRLV vehicle will host a wide sweep of experiments, including a Position Source Global Positioning System (GPS) experiment, two U.S. Army battery experiments, and a Space Integrated GPS missile guidance unit demonstration. Additionally, since the QRLV vehicles are able to provide appropriate trajectories for the U.S. Navy Theater-Wide (NTW) Program, the NTW Program Office will utilize the QRLV launches as windows of opportunity to exercise tracking capabilities and computer-simulated intercept scenarios.

1.4 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA is part of USAF Environmental Impact Analysis Process (EIAP) for the proposed QRLV Program, with launches from KLC. The requirements for the EIAP are included in Air Force Instruction (AFI) 32-7061, *Environmental Impact Analysis Process*, which implements the National Environmental Policy Act (NEPA) and the President's Council on Environmental Quality (CEQ) regulations for implementing with NEPA (40 Code of Federal Regulations [CFR] 1500-1508, and Department of Defense (DoD) Directive 5000.2-R (promulgated by 32 CFR 989). Additional EIAP requirements are included in Air Force Policy Directive 32-70, *Environmental Quality*. The purpose of this EA is to fulfill those requirements for the USAF QRLV Program and to inform the USAF decision-makers of the potential environmental consequences of the proposed action and alternatives.





Afognak Island

Shelikof Strait

Kodiak

Alaska Aerospace Development Corporation - Kodiak Launch Complex

KODIAK ISLAND

Ugak Island

Old Harbor

Pacific Ocean

0 25 50 Miles

SCALE

KODIAK LAUNCH COMPLEX
SITE LOCATION

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 1-1

Based on the QRLV mission to support DoD activities in the Alaskan Theatre, only KLC on Kodiak Island, Alaska, will meet the selection criteria as the launch site for the USAF QRLV Program.

This EA identifies and analyzes potential environmental impacts associated with up to eight suborbital launches of the QRLV vehicles from KLC. The EA will result in either a Finding of No Significant Impact (FONSI) or a finding that an Environmental Impact Statement (EIS) must be prepared for the QRLV Program.

A previous USAF program conducted from KLC was the *ait* Program. This action involved the launch of two different vehicles from KLC. The first vehicle (*ait*-1) was launched on November 5, 1998, and the second vehicle (*ait*-2) was launched on September 15, 1999.

The proposed QRLV Program involves the launch of eight vehicles, with one launch per year, beginning in 2001. The QRLV launches all are expected to occur between February 1 and April 30 of each year. The QRLV launch vehicles may be slightly smaller or the same size as the *ait*-1 and *ait*-2 vehicles.

1.5 DECISION TO BE MADE

The decision to be made regarding the USAF QRLV Program is whether to:

- Sign a Finding of No Significant Impact (FONSI) for the Proposed Action
- Direct the preparation of an Environmental Impact Statement (EIS) for the Proposed Action.
- Take no action on the Proposed Action (i.e., No Action Alternative) and not launch the QRLV vehicles from KLC. With the No Action Alternative, the USAF would not be able to support the Alaskan Command (ALCOM) annual Northern Edge exercise from 2001 through 2008.

1.6 INTERAGENCY COORDINATION

No specific permits or approvals are required for the QRLV Program, as it is within the parameters evaluated in the FAA EA and *ait* EA. However, there is ongoing interagency coordination that is integral to preparation of this EA. The USAF has coordinated with

cooperating agencies, including the FAA/Office of the Associate Administrator for Commercial Space Transportation (AST), NMFS and USFWS. The FAA is included as a cooperating agency for this EA based on its letter of April 20, 2000 (see Appendix A).

On September 28, 2000, an interagency coordination meeting was held via telephone conference call between the USAF, NMFS, FAA and Hubbs-Sea World Research Institute (HSWRI). The purpose of the discussion was to provide information to NMFS regarding the proposed QRLV Program and to solicit their perspective and input. A memo for the record for this interagency coordination meeting/telephone conference is included in Appendix A.

In addition, there have been discussions between the USAF and USFWS regarding the proposed QRLV Program. As follow-on to these discussions, the USAF, NMFS and USFWS are involved in ongoing interagency coordination on biological resources relative to the proposed QRLV Program. This interagency coordination and dialogue includes discussions regarding a potential change in monitoring requirements relative to potential effects on biological resources, primarily the Steller sea lion (*Eumetopias jubatus*). This is addressed in a letter from NMFS to AADC (see Appendix A).

1.7 PUBLIC NOTICE

The USAF sent a Public Notice to the Kodiak Daily Mirror notifying the public of the availability and comment period for the Draft EA. The notice was published in the Kodiak Daily Mirror on November 2, 2000, and November 8, 2000.

The USAF sent a press release to the Anchorage Daily News and the Fairbanks News-Miner, dated November 20, 2000. The press release briefly described the proposed project and notified readers of the availability of the Draft EA and provided details on the public comment period.

An article by the Associated Press that described the proposed project and notified readers of the availability of the Draft EA was published in the November 22, 2000, issue of the Anchorage Daily News.

The Fairbanks News-Miner published an article on November 22, 2000, that described the proposed project and notified readers of the availability of the Draft EA, both electronically on the Web and in hard copy at Kodiak College Library, Kodiak High School Library and the Kodiak Public Library.

The USAF also sent a Public Notice of the availability and comment period for the Draft EA to the Anchorage Daily News. The notice was published in the Sunday, November 26, 2000, edition of the paper.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES (DOPAA)

2.1 PROPOSED ACTION

The proposed action is the U.S. Air Force (USAF) Quick Reaction Launch Vehicle (QRLV) Program, which will consist of the launch of up to eight suborbital vehicles from the Kodiak Launch Complex (KLC) on Kodiak Island, Alaska. The project will launch one QRLV per year, beginning in 2001 and ending in 2008 (see Table 2-1). The launches will be scheduled to occur between February 1 and April 30 of each year. The initial launch is proposed for March 2001.

TABLE 2-1

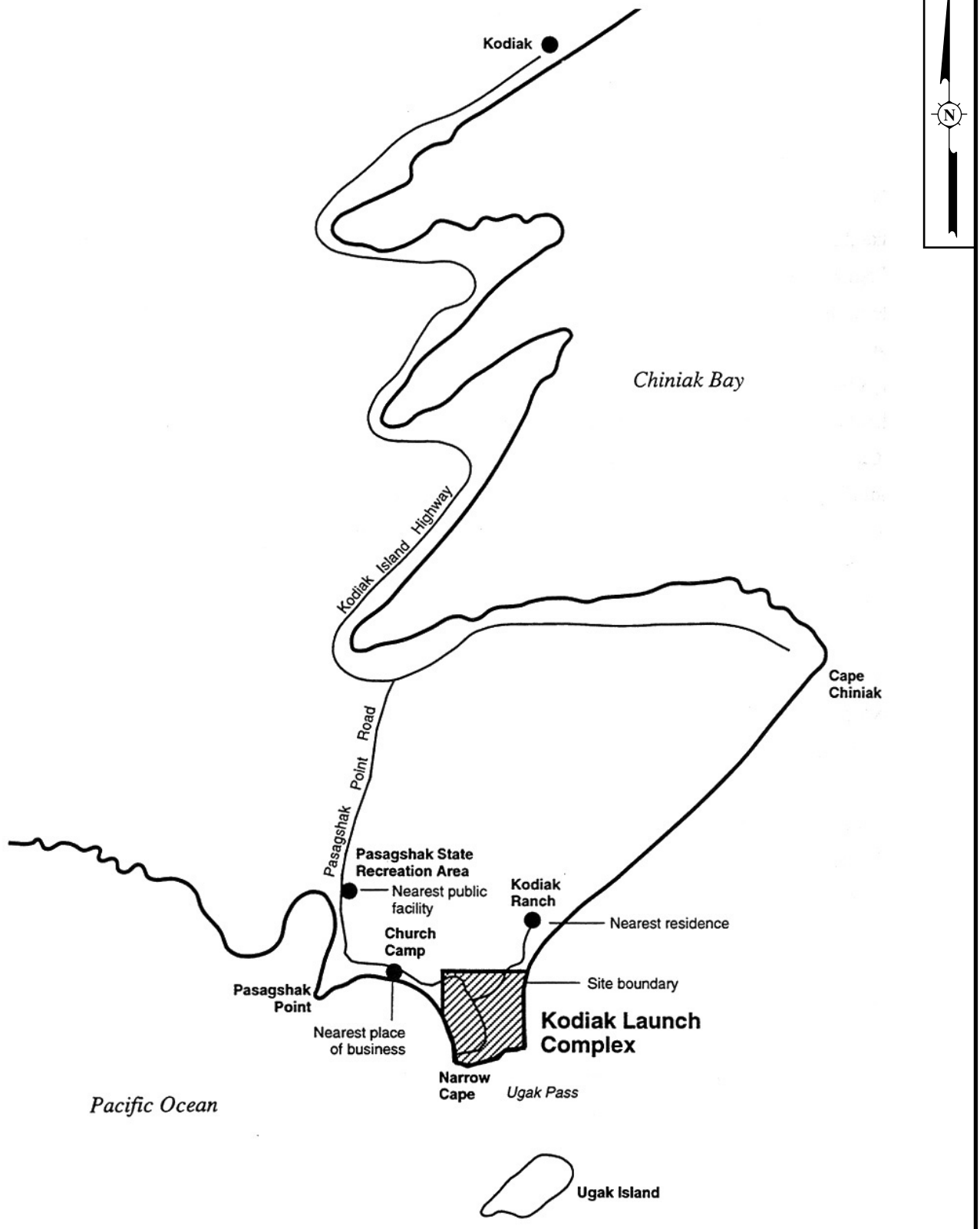
QRLV SUBORBITAL LAUNCHES FROM KLC

2001	2002	2003	2004	2005	2006	2007	2008	TOTAL
1	1	1	1	1	1	1	1	8

The USAF Space and Missile Systems Center, Test and Evaluation Directorate, Launch Test Programs (SMC/TEB) proposes to launch suborbital vehicles from KLC to demonstrate the capability of the QRLV. These launches also will be used for various experiments, ranging from measuring atmospheric attributes to demonstrating new technologies. Depending on the specific mission, the QRLV suborbital launch vehicle would consist of either a single-stage vehicle or a two-stage vehicle. The single-stage vehicle would consist of either a Minuteman I M-56 motor or a Minuteman II/III SR-19 motor. The two-stage vehicle configuration would be either a Minuteman II/III SR-19/Minuteman I/II M-57 or a Delta II Castor IVB/Minuteman I/II M-57. The motors are described in more detail in Section 2.1.2 - Launch Vehicles and Propellants.

2.1.1 KODIAK LAUNCH COMPLEX

The KLC is an existing commercial launch complex operated by the Alaska Aerospace Development Corporation (AADC). It is located on the eastern side of Kodiak Island, on a peninsula called Narrow Cape. It is approximately 40 miles from the nearest population center (Kodiak City and the U.S. Coast Guard Station, Kodiak) (see Figure 2-1). The KLC occupies 43 acres within a 3,100-acre parcel of state-owned property. The KLC consists of a Launch Control and Management Center, Payload Processing Facility, Integration and Processing Facility, Spacecraft Assemblies Transfer Facility, Launch Pad and Service Structure.



KODIAK LAUNCH COMPLEX AND VICINITY

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

SCALE APPROXIMATE

FIGURE 2-1

Support facilities at KLC include access roads, water, power, communications and sewage disposal.

A transporter erector and launch stool will be brought to KLC for the QRLV Program. This configuration was utilized for the two previous USAF launches of *atmospheric interceptor technology* (*ait*)-1 and *ait*-2 and will be utilized for the proposed QRLV launches. The QRLV will be launched from a launch stool located approximately 25 feet northwest of the Integration and Processing Facility (see Figures 2-2 and 2-3).

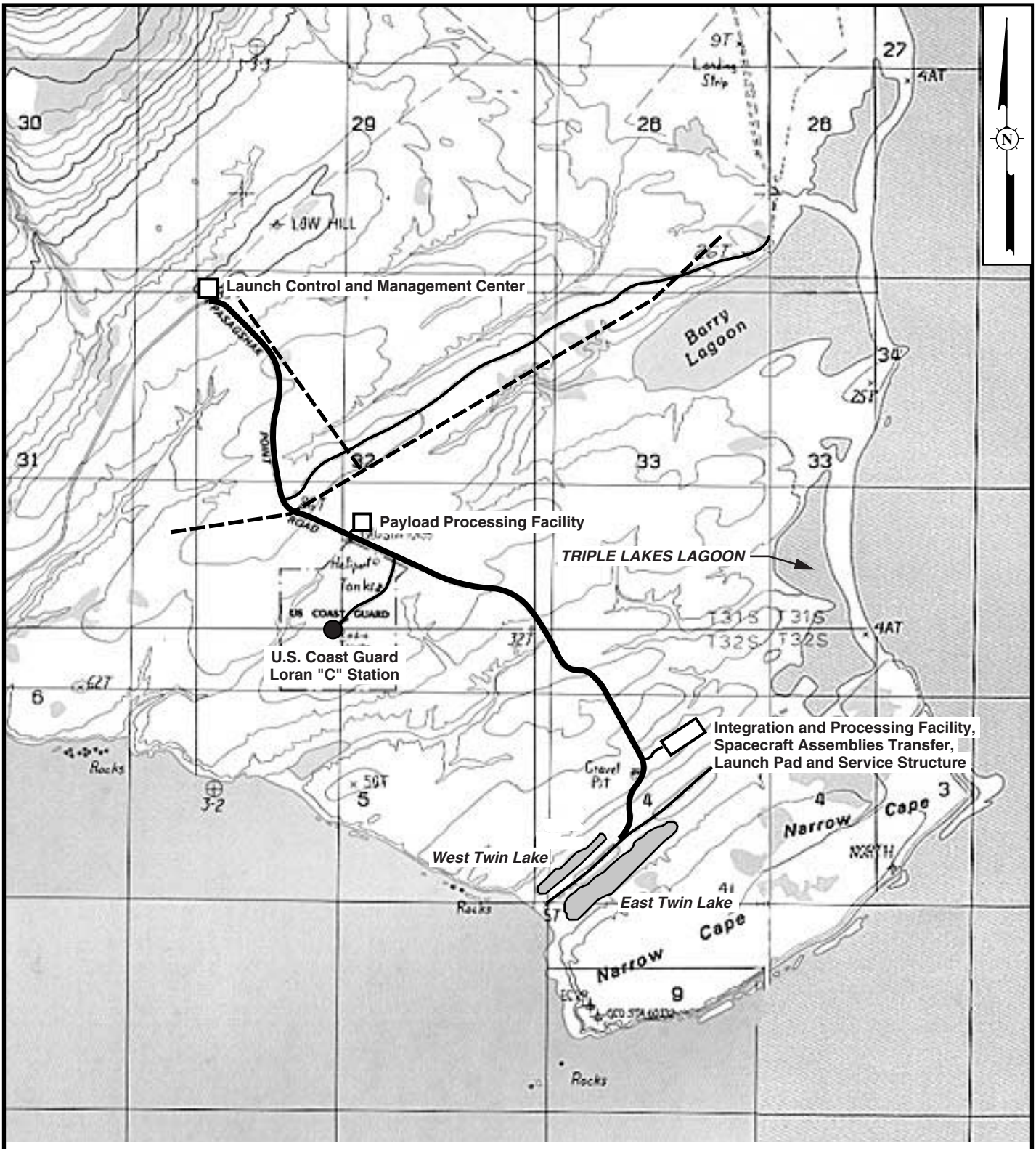
2.1.2 LAUNCH VEHICLES AND PROPELLANTS

Four different launch vehicle configurations consisting of two single-stage vehicles and two 2-stage vehicles may be utilized for the QRLV Program. The vehicle selected for each of the eight QRLV launches will depend on the specific requirements of each mission. The single-stage vehicles are the Minuteman M-56 (M-56) and the SR-19. The two-stage vehicles are the SR-19/M-57 and the Castor IVB/M-57. These launch vehicles are shown in Figure 2-4, and are designated QRLV-1 through QRLV-4. Figure 2-4 also compares the four potential QRLV vehicles to the Athena-2, the largest launch vehicle evaluated in the Federal Aviation Administration (FAA) EA. As noted on Figure 2-4, the QRLV-3 vehicle is the same as *ait*-1, launched from KLC in 1998, and the QRLV-4 vehicle is the same as *ait*-2, launched from KLC in 1999.

The four QRLV launch vehicle configurations will carry solid rocket propellant, which will be installed in the rocket motors prior to their transport to Kodiak. The solid propellant in the QRLV launch vehicles will be expended during launch and flight. These propellants are shown in Table 2-2.

For purposes of safety rating, the propellants are distinguished as Class 1.1 (potentially detonable) or Class 1.3 (non-detonable). Most propellants will burn (deflagrate) but will not explode violently (detonate) and so are designated Class 1.3. Some propellants can transition from deflagration to detonation and so are considered more hazardous and usually are designated as Class 1.1.

The Department of Defense (DoD) classification of 1.1 or 1.3 determines the method of labeling and the cost of shipping propellants, loaded missiles, ammunitions and other such materials.



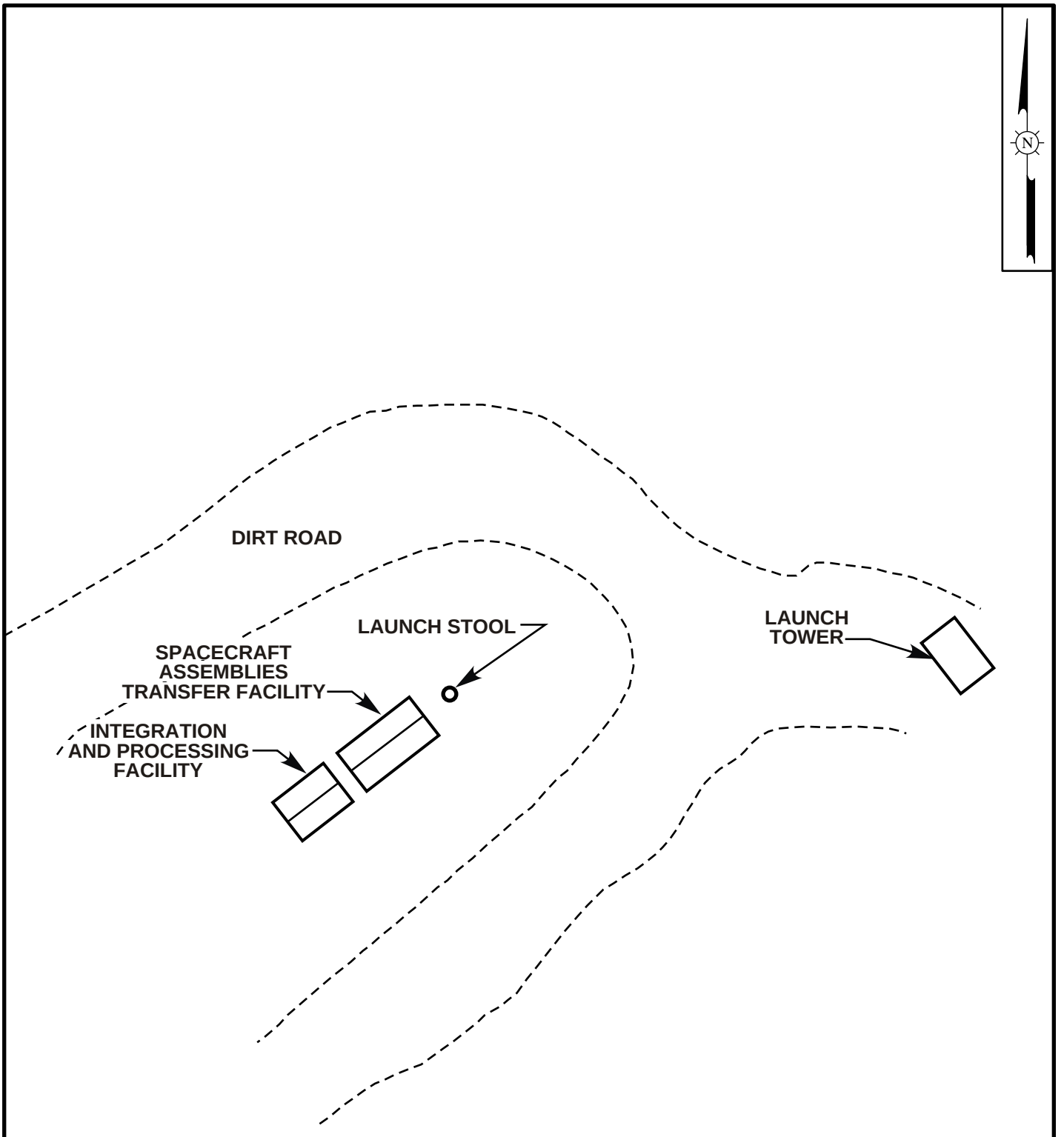
LEGEND

- Powerlines
- Access Road and Underground Utilities

KODIAK LAUNCH COMPLEX
FACILITY LAYOUT

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-2

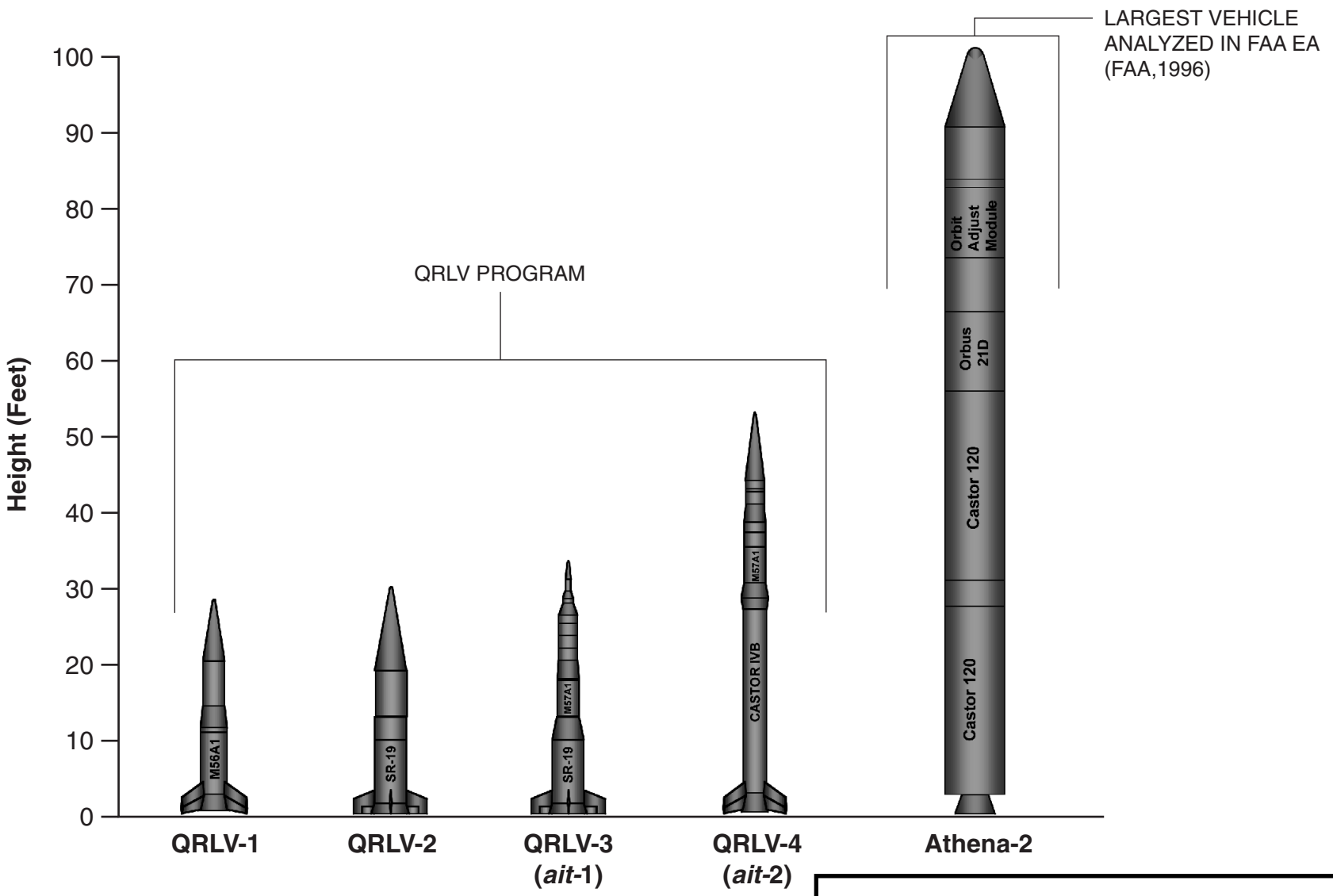


SCALE APPROXIMATE

LOCATION OF LAUNCH FACILITIES AND LAUNCH STOOL

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-3



NOTES:

QRLV-3 = *ait*-1 (FLOWN AT KLC IN 1998)
QRLV-4 = *ait*-2 (FLOWN AT KLC IN 1999)
ATHENA-2 = LMLV-2 (LARGEST ROCKET THAT CAN BE FLOWN OUT OF KLC)

COMPARISON OF LAUNCH VEHICLES

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-4

TABLE 2-2

QRLV LAUNCH VEHICLES
PROPELLANT CHARACTERISTICS

LAUNCH VEHICLE	PROPELLANT COMPONENTS	CLASSIFICATION	QUANTITY
QRLV-1 (Minuteman M-56)	Ammonium perchlorate 65% Polyurethane 18% Aluminum 17%	1.3	10,372 lbs (4,705 kg)
QRLV-2 (Single-Stage SR-19)	Ammonium perchlorate 73% Carboxyl-terminated polybutadiene 12% Aluminum 15%	1.3	13,748 lbs (6,235 kg)
QRLV-3 (SR-19/M-57) • First Stage (SR-19)	Ammonium perchlorate 73% Carboxyl-terminated polybutadiene 12% Aluminum 15%	1.3	13,748 lbs (6,235 kg)
• Second Stage (M-57)	Ammonium perchlorate and cyclotetramethilene tetranitramine 21% Aluminum 20% Nitrocellulose 22% Nitroglycerine 29% Triacetin 6% 2-Nitrodiphenylamine 1% Resorcinol 1% Graphite (additive) <1%	1.1	3,660 lbs (1,660 kg)
QRLV-4 (Castor IVB/M-57) • First Stage (Castor IVB)	Aluminum 16% Ammonium perchlorate 70% Hydroxyl-terminated polybutadiene 14%	1.3	22,275 lbs (10,102 kg)
• Second Stage (M-57)	Ammonium perchlorate and cyclotetramethilene tetranitramine 21% Aluminum 20% Nitrocellulose 22% Nitroglycerine 29% Triacetin 6% 2-Nitrodiphenylamine 1% Resorcinol 1% Graphite (additive) <1%	1.1	3,660 lbs (1,660 kg)

The classification also determines the required limits of propellants that can be manufactured or stored at any one site, plus the minimum separation distance between that site and other buildings or sites (Sutton, 1992).

The propellants for the four QRLV launch vehicles and their classifications are shown in Table 2-2. In general, the propellant weight comprises about 90 percent of the total weight of the rocket motor. When built into a launch vehicle, the propellant weight is about 75 percent of the total weight. The substances shown in Table 2-2 are suspended in a binder matrix within the solid rocket motors. In addition to the propellants, hydraulic fluid is enclosed in the vector control system and nozzle control system. Under nominal conditions, hazardous materials related to the QRLV vehicles are not released and do not present a potential impact.

The proposed action will involve the use of small quantities of hazardous materials during the processing of the QRLV vehicle prior to launch from KLC. The threat of accidental and unplanned release of hazardous materials, the amount of hazardous materials generated, and the amount of hazardous materials stored will be minimized through management techniques that are identified in the following: KLC Spill Prevention, Control and Countermeasure Plan; KLC Safety Procedures; KLC Emergency Response Plan, and the Site Spill Response Plan. In addition, standard USAF policies and procedures will be followed. These measures require USAF personnel to package and remove for disposal at USAF facilities any hazardous materials brought onsite in association with the QRLV program. As a result, no hazardous waste will remain onsite subsequent to a QRLV launch.

2.1.2.1 M-56 (QRLV-1)

This single-stage vehicle consists of the M-56 motor, on which the re-entry vehicle (RV) assembly is mounted. The RV houses the guidance avionics and equipment for experiments. The Flight Termination System (FTS) is a linear-shaped charge located along the longitudinal axis of the motor.

The M-56 was originally developed as a stage 2 motor on the Minuteman I. The M-56 is a four-nozzle solid propellant rocket motor with a titanium case. It uses a thrust vector control for steering and stabilization. It is 12.96 feet in length, 3.71 feet in diameter and 11,402 pounds in weight (including propellant). The motor contains approximately 10,372 pounds of solid propellant. The inner propellant is Class 1.3, designated ANP-2864. The outer propellant also is

Class 1.3, designated ANP-2862, which consists of ammonium perchlorate, polyurethane and aluminum (see Table 2-2).

2.1.2.2 SR-19 (QRLV-2)

This single-stage vehicle consists of the SR-19 motor, on which the RV assembly is mounted. The RV houses the guidance avionics and equipment for experiments. The FTS is a linear-shaped charge located along the longitudinal axis of the motor.

The SR-19 originally was developed as an upgraded second stage for the Minuteman II. The SR-19 is a single-nozzle solid propellant rocket motor that uses a titanium case. The motor is 13.5 feet in length, 4.3 feet in diameter and 15,507 pounds in weight (including propellant). The motor contains approximately 13,745 pounds of a Class 1.3 solid propellant, designated ANB-3066, containing ammonium perchlorate, carboxyl-terminated polybutadiene and aluminum (see Table 2-2).

2.1.2.3 SR-19/M-57 (QRLV-3)

This is a two-stage vehicle consisting of a first-stage SR-19 and a second-stage M-57, on which the RV assembly is mounted. The RV houses the guidance avionics and equipment for experiments. The FTS is a linear-shaped charge located along the longitudinal axis of the motors.

The first-stage SR-19 originally was developed as an upgraded second stage for the Minuteman II. It is a single-nozzle solid propellant rocket motor that uses a titanium case. The motor is 13.5 feet in length, 4.3 feet in diameter and 15,507 pounds in weight (including propellant). The motor contains approximately 13,745 pounds of a Class 1.3 solid propellant, designated ANB-3066, containing ammonium perchlorate, carboxyl-terminated polybutadiene and aluminum.

The second-stage M-57A1 originally was designed as the third stage for the Minuteman II and Minuteman III. This is a four-nozzle motor that uses a fiberglass case. The motor is 7.12 feet in length, 3.15 feet in diameter and 4,353 pounds in weight. The M-57 motor contains approximately 3,600 pounds of a Class 1.1 solid propellant that contains ammonium perchlorate/cyclotetramethilene tetranitramine, nitrocellulose, nitroglycerine, aluminum and triacetin (see Table 2-2).

2.1.2.4 Castor IVB/M-57 (QRLV-4)

This is a two-stage vehicle consisting of a first-stage Castor IVB and a second-stage M-57, on which the RV assembly is mounted. The RV houses the guidance avionics and equipment for experiments. The Castor IVB FTS is a circumferential charge located at the forward dome, and the M57 FTS is a linear-shaped charge located along the longitudinal axis of the motor.

The Castor IV has been used with the Delta II launch vehicle. The first-stage Castor IVB is a single-nozzle solid propellant rocket motor with a steel case. The Castor IVB motor was modified from the Castor IV to use a flexseal bearing and hydraulic thrust vector actuation system for nozzle control. The motor is 29.5 feet in length, 3.34 feet in diameter and 25,371 pounds in weight (including propellant). The motor contains approximately 22,275 pounds of Class 1.3 solid propellant, designated TP-H8299, which contains ammonium percholate, hydroxyl-terminated polybutadiene and aluminum.

The second-stage M-57A1 originally was designed as the third stage for the Minuteman II and Minuteman III. This is a four-nozzle motor that uses a fiberglass case. The motor is 7.12 feet in length, 3.15 feet in diameter and 4,353 pounds in weight. The M-57 motor contains approximately 3,660 pounds of a Class 1.1 solid propellant that contains ammonium perchlorate/cyclotetramethilene tetranitramine, nitrocellulose, nitroglycerine, aluminum and triacetin (see Table 2-2).

2.1.3 PAYLOADS

For the single-stage vehicles (M-56 and SR-19), the standard payload would consist of a guidance and navigation suite consisting of Global Positioning System (GPS) navigation hardware. For the two-stage configurations (SR-19/M-57 and Castor IVB/M-57), the standard payload would contain only a guidance suite for tracking purposes. The payload for each of the QRLV launches will house experiments that will vary according to the specific requirements of the mission. The payloads are constructed primarily of aluminum, steel, titanium and electronic components (e.g., ceramics, tin/lead solder, fiberglass, glasses, copper and silicon). There are no radioactive materials or ionizing materials as part of the vehicle or its payloads.

The QRLV-1 flight in March 2001 will contain three experiments that would support a U.S. Army battery experiment, Honeywell GPS experiment, U.S. Navy demonstration flight, and USAF Research Lab differential GPS experiment. The experiments for missions other than the

March 2001 launch are not known at this time, but are expected to contain similar types of experiments as the package for the March 2001 QRLV-1 launch.

2.1.4 VEHICLE TRANSPORT, PROCESSING AND LAUNCH

The following procedures will be implemented to transport the launch vehicles to KLC and process them for launch:

- The USAF QRLV vehicles will be refurbished at Hill Air Force Base (AFB), Utah. The Castor IVB will be processed by the Thiokol Propulsion Group in Utah.
- Single-stage motors will be transported via a Military Transport Aircraft from Hill AFB to the Kodiak Airport. From there, the motors will be transferred to KLC by a tractor/trailer designed to transport Minuteman motors. The rocket motor (with propellant installed) will be transported from the Kodiak Airport to KLC in accordance with U.S. Department of Transportation (DOT) regulations.
- Two-stage motors will be placed in a trailer designed specifically for each motor and transported by a Military Transport aircraft from Hill AFB to the Kodiak Airport. The rocket motors (with propellant installed) will be transported from the Kodiak Airport to KLC in accordance with U.S. DOT regulations.
- The trailers are highway approved. A certified commercial carrier will be contracted to transport the trailers from the Kodiak Airport to KLC via Kodiak Island Highway and Pasagshak Point Road.
- The instrumentation packages will be transported to Kodiak via aircraft and then to KLC by truck. The instrumentation package will be integrated with the launch vehicle on the Transporter Erector (TE). See Figure 2-5 for a representative photograph of the *ait*-2 being processed in the Integration and Processing Facility (IPF) at KLC. This photograph also shows the relative size of the suborbital vehicles (QRLV-4) that will be used for the QRLV Program.
- At the IPF, the USAF QLRV vehicles will be removed from the tractor/trailer and placed on the TE. The TE will move into place and erect the USAF QRLV onto the launch stool. Figure 2-6 shows the *ait*-2 being readied for launch on the TE. This figure shows the relative size of the suborbital vehicles (QRLV-4) that will be launched by the QRLV program.
- Final testing and checkout of the integrated USAF QRLV vehicles and instrumentation package will be completed while the vehicle is on the launch stool. These checks will occur with the concurrence of the USAF Program Office (SMC/TEB), range safety Naval Air Warfare Center Weapons Division (NAWCWPNS) and the contractor.

***ait*-2 BOOSTER AND PAYLOAD IN INTEGRATED PROCESSING FACILITY**

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-5

TRANSPORTER ERECTOR ELEVATING *ait*-2 BOOSTER AND PAYLOAD

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-6

- Upon completion of processing and testing, the USAF QRLV will be ready for launch.

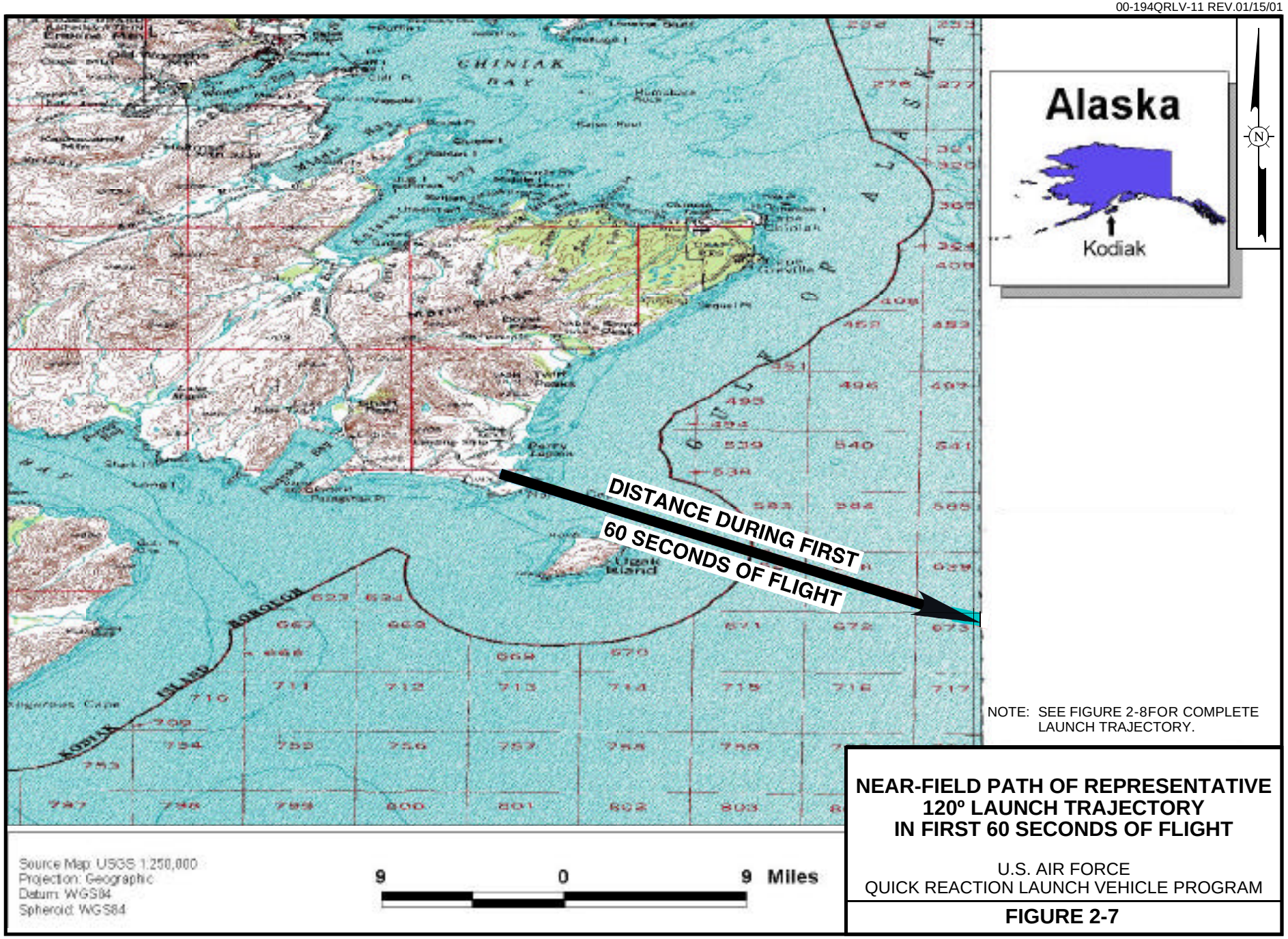
The following launch procedures will be followed for the USAF QRLV Program to assure a successful launch:

- Initial range setup to assure that essential range assets are operating properly.
- Initial vehicle testing to verify that the flight computer, avionics power systems, vehicle voltages/current readings, GNC and FTS systems are operating properly.
- Final vehicle arming.
- Final launch procedures that incorporate coordination between range assets.

The success rate since 1980 for all guided sounding rocket missions (the category that QRLV missions fall within) launched by the USAF Space and Missile Systems Center, Test and Evaluation Directorate (SMC/TE), is 92 percent. The SMC/TE was restructured in 1995, bringing the success rate for all launches since that time to 100 percent. The corresponding reliability (from a test set of 18/18 successful launches) has been calculated to be 95 percent. As a result, a launch failure related to the QRLV Program is unlikely.

2.1.5 LAUNCH TRAJECTORY AND RANGES

The QRLV Program consists of eight launches from KLC, beginning in 2001. All eight QRLV launches would be southeasterly along a representative launch azimuth of 120 degrees (see Figure 2-7). Depending on the launch vehicle utilized for each of the eight missions, the distance to splashdown in the Pacific Ocean would be different (see Figure 2-8). The QRLV-1 would fly the shortest distance, and QRLV-4 would fly the greatest distance. Splashdown for the expended stages of QRLV-3 and QRLV-4 would be similar to those that occurred with *ait*-1 and *ait*-2, as the same launch vehicles would be utilized. Figure 2-8 shows representative trajectory and range (approximate splashdown points) for each of the four QRLV vehicles. Table 2-3 shows launch and flight details.

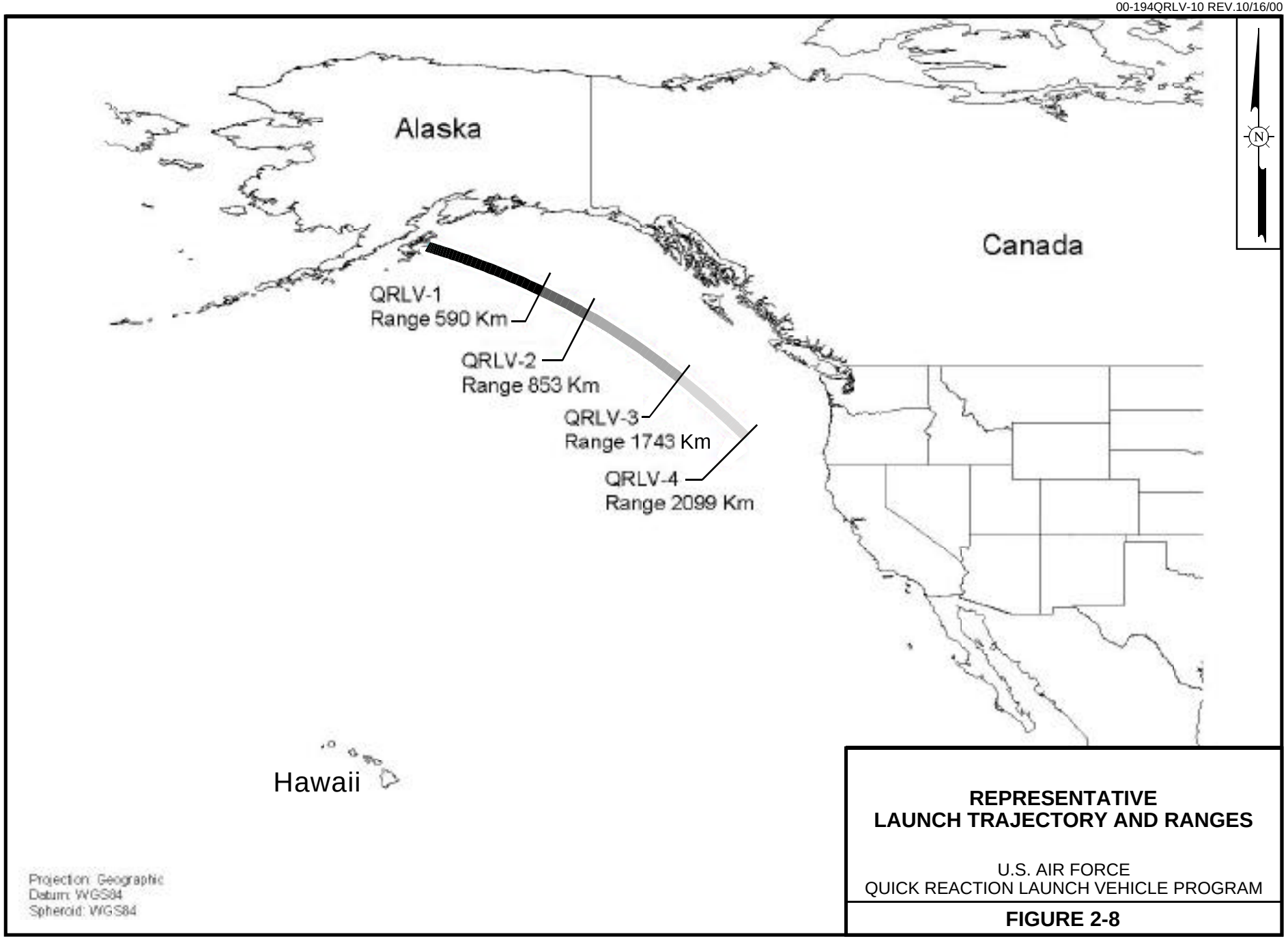


NOTE: SEE FIGURE 2-8FOR COMPLETE LAUNCH TRAJECTORY.

NEAR-FIELD PATH OF REPRESENTATIVE 120° LAUNCH TRAJECTORY IN FIRST 60 SECONDS OF FLIGHT

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-7



REPRESENTATIVE LAUNCH TRAJECTORY AND RANGES

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 2-8

TABLE 2-3

LAUNCH AND FLIGHT DETAILS
QRLV LAUNCH VEHICLES

LAUNCH VEHICLE	APOGEE	SPLASHDOWN	
		TIME (seconds)	RANGE
QRLV-1	160 km	T+423	590 km
QRLV-2	462 km	T+705	853 km
QRLV-3	693 km	T+926	1,743 km
QRLV-4	953 km	T+1,102	2,099 km

2.1.6 RANGE SAFETY

The Naval Air Warfare Center (NAWC) safety office at Point Mugu, California, has primary responsibility for Range Safety on the QRLV missions and would provide Range Safety services at KLC. The Navy would use a P-3 Orion aircraft as a remote area safety aircraft (RASA) and to collect telemetry (TM). There also would be a mobile ground TM collection trailer and a TM dish. The RASA and a ground flight termination van would house the Command Destruct System with the capability to track the QRLV in flight and provide a command destruct signal, if necessary.

The NAWC would track the missile through powered flight. It can terminate flight in the event the missile deviates from the programmed trajectory. This would assure that the public is not exposed to an unacceptable level of risk. The NAWC will minimize near-shore destruct actions to the extent feasible by allowing an anomalous vehicle to continue to fly within the predetermined destruct corridor. However, due to prescribed safety constraints, if a vehicle crosses the predetermined destruct boundary, NAWC must terminate it immediately, regardless of its position relative to the shore.

2.2 ALTERNATIVES

2.2.1 ALTERNATIVE SITES

In addition to the proposed action, which would be launched from the existing KLC, the USAF considered whether other sites could meet the QRLV mission requirement to support DoD activities in the Alaskan Theatre. No alternative sites are available that would meet the mission requirements of the QRLV Program.

2.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. Additionally, under the No Action Alternative, the ability of the Alaskan Command (ALCOM) to prepare for and react to Theater Ballistic Missile threats would be diminished. The QRLV launches are the only realistic way to exercise Ballistic Missile Warning and Battle Management, Command, Control and Communication (BMC^3) capabilities, and test defense planning strategies. Therefore, under the No Action Alternative, ALCOM would be unable to adequately train for Theater Ballistic Missile threats.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The environmental analysis for construction and operation of the Kodiak Launch Complex (KLC) was documented in the *Environmental Assessment of the Kodiak Launch Complex* (Federal Aviation Administration [FAA], 1996). The FAA Environmental Assessment (EA) evaluated the existing environment of Kodiak Island and the KLC site.

The environmental analysis for implementation of the U.S. Air Force (USAF) *ait* Program was documented in the *Environmental Assessment for U.S. Air Force atmospheric interceptor technology (ait)* Program (USAF, 1997). The *ait* EA analyzed the existing environment and potential impacts of launching two USAF suborbital launch vehicles from KLC for the *ait* Program. For the proposed USAF Quick Reaction Launch Vehicle (QRLV) Program, the USAF may utilize up to four different suborbital launch vehicles and configurations. The largest of these, the Castor IVB/M-57 (QRLV-4), is the same as the *ait*-2 suborbital launch vehicle. As a result, the findings of the *ait* EA, as they relate to those aspects of the existing environment that could be affected by launch of the QRLV launch vehicles, are relevant to the proposed action.

For purposes of this EA, the existing environment is considered to be the vicinity of KLC and Kodiak Island as analyzed in both the FAA EA and the *ait* EA. This includes the entire KLC site, Kodiak Island, and the surrounding terrestrial and marine environments, including Ugak Island, about 3 miles southeast of KLC. The existing marine environment is assumed to extend to the continental shelf break.

In addition to the above, the environmental consequences of constructing KLC, plus impacts of the two previous launches of the suborbital USAF *ait* launch vehicles are considered to be part of the existing environment. Their impacts, in addition to undisturbed elements in the environment of KLC, Kodiak Island and its environs, are within the baseline against which potential impacts of the proposed QRLV program will be assessed.

The following sections provide summaries of information provided in pertinent sections of the FAA EA and the *ait* EA. As appropriate, additional information obtained during the various monitoring and biological studies also is provided.

3.2 GEOLOGY AND SOILS

The KLC is located on Kodiak Island, an extension of the Kenai Mountains to the north where metamorphic rocks predominate. Gently folded sandstone occurs in the area of KLC, underlain by a mantle of completely weathered bedrock grading downward to moderately weathered intact bedrock. This is underlain by sandstone bedrock that is predominantly soft and friable silty fine sandstone. The region is near the margin of the North American and Pacific tectonic plates, with a northeast to southwest-trending fault approximately one mile west of KLC. The region is seismically active; low intensity earthquakes are frequently recorded. The KLC is located above the 30-meter elevation above sea level to provide safe refuge from flooding due to tsunamis. It is not within a floodplain (FAA, 1996).

Soils in the vicinity of KLC vary, but primarily are upland soils in the Kodiak soils series, with low natural fertility. These upland soils are well-drained but are always moist due to frequent rains. Erosion on slopes of less than 7 percent is not an issue. At KLC, soils consist of a surface of approximately 10 centimeters (cm) thick of partly decayed vegetation, underlain by a layer of volcanic ash. The ash-buried soils are strongly acidic with a relatively high cation exchange capacity due to the high organic content, resulting from a 1912 volcanic eruption about 90 miles west of Kodiak Island. As a result, the KLC soils can buffer pH changes using cation exchange (FAA, 1996).

Based on the results of monitoring subsequent to the *ait*-1 and *ait*-2 launches, it was concluded that the two launches did not result in changes to the existing environment relative to geology and soils (see Section 4.2 - Geology and Soils).

3.3 WATER RESOURCES

The QRLV launches will occur from KLC, where the greatest body of water is the surrounding Pacific Ocean. Water resources at KLC consist of small streams, two lakes (East Twin Lake and West Twin Lake) and two lagoons (Triple Lakes and Barry Lagoon) (see Figure 2-2). The streams are generally less than 3.2 kilometers (km) in length, with an average discharge of less than 1.3 cubic meters per second (m/sec). East Twin Lake and West Twin Lake are freshwater lakes that drain to the ocean. East Twin Lake is approximately 1 meter deep, with a capacity of 57 million liters. West Twin Lake is about one-half that size, with a capacity of about 20 million liters. Recharge is provided by precipitation and by runoff from the surrounding watershed. Triple Lakes and Barry Lagoon are considered salt water-influenced lagoons (FAA, 1996).

Water quality sampling indicates that conductivity, pH, dissolved oxygen and alkalinity of the lakes and streams in the vicinity of KLC are within typical ranges found at Kodiak Island and are suitable for a range of aquatic organisms. Some of the alkalinity levels are below 20 milligrams of calcium carbonate per liter, indicating a low capacity to buffer pH changes, although adequate for maintaining pH at a neutral level. Water in the lakes is not suitable for drinking, as it exceeds the State of Alaska Drinking Water Regulations for total coliform bacteria (FAA, 1996).

Based on the results of monitoring subsequent to the *ait*-1 and *ait*-2 launches, it was concluded that the two launches did not result in changes to the existing environment relative to surface water (see Section 4.3 - Water Resources).

3.4 BIOLOGICAL RESOURCES

3.4.1 TERRESTRIAL SPECIES

Vegetation covers most of KLC, comprised of meadows, shrubland, wetlands and intermittent stands of spruce. Meadows are the most prevalent, comprised primarily of a hairgrass-mixed forb meadow plant association. The two shrub associations consist of closed alder and closed mixed alder-willow. Vegetated wetlands include semi-permanently flooded areas, saturated emergent wetlands and marshes (FAA, 1996).

Kodiak Island provides habitat for 221 species of terrestrial and marine birds, including sea ducks. The KLC provides seasonal habitat for an estimated 143 of these species. The area of Narrow Cape supports 12 species of mammals, including mountain goat (*Oreamnos americanus*), Sitka black-tailed deer (*Odocoileus hemionus*), brown bear (*Ursus arctos*) and beaver (*Castor canadensis*). Of these, none is found commonly in the vicinity of the launch site.

In addition, horses, cattle and bison graze under lease to a local ranch (FAA, 1996). A 7-foot chain link fence surrounds the Integration and Processing Facility and the Spacecraft Assembly and Transfer Facility, thereby preventing animals from wandering onto the premises. The fence, and nearby steep topography, keep grazing animals away from the launch stool. The nearest game trail passes about 250 feet south of the launch stool location.

3.4.2 FISH

Streams and lakes on the KLC site are relatively small and shallow. As a result, freshwater fishery resources are limited. On KLC, stickleback (presumably *Gasterosteus aculeatus* or *Pungitius pungitius*) are known to occur in one stream and in East Twin Lake. The Alaska Department of Fish and Game stocks East Twin Lake with rainbow trout. The closest major salmon stream is the Pasagshak River, approximately 10 km (6 miles) west of KLC (FAA, 1996).

Numerous species of fish and invertebrates inhabit nearshore and offshore waters around Kodiak Island. The most common marine fish are flounder, sole, pollock, skate, cod and halibut. Other marine organisms that inhabit the area include crabs, scallops, octopus, shrimp, cockles, clams, snails and mussels (FAA, 1996).

3.4.3 MARINE BIRDS

Thirty-eight species of marine birds are known to occur around Kodiak Island, although no seabird colonies are known to occur in the vicinity of KLC or on Ugak Island. The nearest seabird colony is believed to be an Arctic and Aleutian tern colony located 3 to 5 km (2 to 3 miles) north of the KLC launch pad. Ugak Pass, the strait between Narrow Cape and Ugak Island, is attractive to marine birds year-round because of its shallow waters and abundant marine grasses, which support large populations of fish and invertebrates. Eiders and sea ducks common to the area include King eiders, Steller's eiders, harlequin ducks, oldsquaw, black scoters, surf scoters and white-winged scoters. These species occur from November to May. During winter months, Steller's eiders are commonly observed off Narrow Cape in the vicinity of KLC (FAA, 1996). The Steller's eider is described in more detail under Section 3.4.6 - Special Status Species, in Section 3.4.6.3 - Steller's Eider.

3.4.4 MARINE MAMMALS

The following marine mammals occur in the Kodiak Island area: Alaskan sea otter (*Enhydra lutris*), Steller sea lion (*Eumetopias jubatus*), killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), fin whale (*Balaenoptera physalis*), minke whale (*B. acutorostrata*), humpback whale (*Megaptera novaeangliae*), harbor seal (Phoca vitulina), Dall's porpoise (*Phocoenoides dalli*) and harbor porpoise (*Phocoena phocoena*) (Wynne, 1992).

In the vicinity of KLC, three species of pinnipeds are found: Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*) and northern fur seal (*Callorhinus ursinus*). There are

four major rookeries (breeding grounds) in the Kodiak Archipelago and 17 sea lion haulouts on or near Kodiak Island, the closest being on Ugak Island, approximately 5 km (3 miles) southeast of KLC (FAA, 1996). Additional information is provided in Section 3.4.6.1 - Steller Sea Lion and Harbor Seal.

3.4.5 MACROINVERTEBRATES

Macroinvertebrates were collected by University of Alaska, Anchorage, Environment and Natural Resources Institution (ENRI) for the launches of *ait*-1 and *ait*-2 to detect bioindicators of change attributable to the launches. Results from the *ait*-1 launch showed that total taxa richness measures and percent dominant taxon did not differ from the pre-*ait*-1 launch to post-*ait*-1 and post-*ait*-2 launches. Slight differences in Mayflies (ephemeroptera), stoneflies (plecoptera) and caddisflies (trichoptera) (EPT) taxa (a pollution intolerance measure) did not differ from normal seasonal changes. Values of the family-level biotic index (FBI), a tolerance measure, were slightly lower postlaunch, indicating improved water quality (ENRI, 2000). It is therefore concluded that the two previous launches did not result in changes to the existing environment relative to macroinvertebrate diversity as a bioindicator of change.

3.4.6 SPECIAL STATUS SPECIES

A species is considered "special status" if it is federally- or state-listed or is a candidate for such listing. No federally listed endangered, threatened or candidate terrestrial species are known to occur at KLC. However, the bald eagle (*Haliaeetus leucocephalus*), protected under the Eagle Protection Act (16 USC 668-668c), has nested historically in the Narrow Cape area and within the boundary of KLC. It is certainly present in the area - sightings were made by ENRI in both November 1998 and September 1999 (ENRI, 1999, 2000).

Four endangered/threatened species are reported to inhabit the environment off Narrow Cape. The Steller sea lion (*Eumetopias jubatus*), the humpback whale (*Megaptera novaeangliae*; also state listed) and the Steller's eider (*Polysticta stelleri*) are reported frequently. The short-tailed albatross (*Phoebastria [=Diomedea] albatrus*) is sighted infrequently in the area, as it is normally found in pelagic waters.

Based on the results of monitoring the *ait*-1 and *ait*-2 launches (ENRI, 1999; Stewart, 1999; Bowles, 2000a; ENRI, 2000), it was concluded that there was no significant risk to special status species in the vicinity of KLC.

3.4.6.1 Steller Sea Lion and Harbor Seal

Two species of pinnipeds, the harbor seal and the Steller sea lion, are concentrated on haulouts and rookeries in the area. It is estimated that approximately 300 to 400 Steller sea lions utilize Ugak Island as a haulout, but not a rookery, during the late summer and early fall postbreeding period (USAF, 1997). The Steller sea lion haulout on the northeast tip of Ugak Island and the harbor seal hauling/pupping areas on the seaward side of the island are the closest to the QRLV launch site and trajectory line.

Observations of Steller sea lions and harbor seals were made during monitoring for the *ait*-1 and *ait*-2 launches. During monitoring for the November 5, 1998, *ait*-1 launch, up to 370 harbor seals were observed on three traditional harbor seal haulout areas on the northeast and eastern shores of Ugak Island. No Steller sea lions were observed on the island at that time (ENRI, 1999). During monitoring for the September 15, 1999, *ait*-2 launch, 60 to 70 Steller sea lions were observed on the Ugak Island haulout on both the day of launch and the day after launch. Harbor seals also were observed, at two different locations on the east side of Ugak Island, with an estimated 60 to 80 animals at one location and more than 200 at another. Approximately 30 harbor seals were observed the day after launch (ENRI, 2000).

Of the two species, the Steller sea lion is considered the most vulnerable because it is listed as an Endangered Species. However, from a biological point of view, during the pupping season (May through July) the harbor seal is more vulnerable because harbor seals are known to pup on the southeast side of Ugak Island (Wynne, 1996). Steller sea lions do not pup on Ugak Island. There has been a significant decline in harbor seal populations in the Gulf of Alaska, Prince William Sound and the Aleutian Islands since the 1970s, with some areas seeing declines of up to 90 percent (Pitcher, 1997 unpub). The harbor seal is now listed as a Species of Special Concern by the State of Alaska. The reason for the decline is unknown, but it may be linked to similar decreases in Steller sea lion and Northern fur seal numbers in the region.

3.4.6.2 Whales

Of the five whales that occur in the area, only the gray and humpback whale occur in numbers. The presence of all but the gray whale in the area is for the most part seasonal, peaking during the summer, when stocks of prey species are high.

Gray whales migrate southbound past Kodiak Island during the October - December period and migrate northbound during the February - May period. Peak concentrations occur in November

and during the March - May period. A major area of spring concentration and probably feeding occurs from the north end of Chiniak Bay south to the Narrow Cape/Ugak Island area. Most whales passing Narrow Cape travel within 760 m (2,500 feet) of the shore during the southbound migration. While this pattern is typical, it should be noted that gray whales also can be present in numbers outside the migratory season. In 1999, gray whales were observed during the summer and fall in the vicinity of Ugak Bay (Calambokidis, 2000), including during the *ait*-2 launch (Bowles, 2000a). While summering gray whales have been reported regularly off Washington and Oregon, they have not previously been seen summering around Kodiak Island, so the noted behavior may be unusual.

3.4.6.3 Steller's Eider

Steller's eiders are considered a common winter/spring resident around Kodiak Island. Wintering Steller's eiders occupy shallow, near-shore waters in much of southwestern and south coastal Alaska, including along the Alaska Peninsula and Kodiak Archipelago. Usually, they remain within about 400 m of shore in waters less than 10 m deep. Thus, along with the bald eagle, they are the species of special status most likely to be exposed to relatively high noise levels from QRLV launches and, possibly, debris from a failed launch.

Systematic aerial surveys around Kodiak and Trinity Islands located 2,892 eiders in 1992, 4,032 in 1993 and 5,349 in 1994 (Larned and Zwiefelhofer, 1995). During these surveys, large flocks were seen in lagoons and eelgrass beds.

Both ENRI and the U.S. Fish and Wildlife Service (USFWS) conducted baseline natural resource inventories of the KLC site and surrounding areas in 1994 and 1997 (ENRI, 1995 to 1998; Larned and Zwiefelhofer, 1995; Wilbor and Tande, 1998), using aerial surveys and shoreline-based point counts. The maximum count was 5,349 eiders from a survey that covered Chiniak Bay, Narrow Cape, Ugak Island, Ugak Bay, Alitak Bay, Portage Bay, Olga Bay, Cape Alitak and the Trinity Islands. This value is likely to be a minimum because the survey that produced this count (Larned and Zwiefelhofer, 1995) did not cover all areas known to be used by eiders, such as Pasagshak Bay.

During these surveys, Steller's eiders were seen in flocks numbering 100 to 250 and 250 to 450 birds offshore of Barry Lagoon and Triple Lakes in the vicinity of the Ugak Island/Narrow Cape shoal, and in Pasagshak Bay. They were present from October through March (Wilbor and Tande, 1998). Most birds were sighted in flocks numbering more than 100 birds, including flocks of more than 200 birds sighted in the lagoon in the immediate vicinity of the KLC launch pad (February and

March 1997). The largest raft of birds, numbering 455, was sighted off the north side of Ugak Island, over the Ugak Island/Narrow Cape shoal. The large concentration of birds in the area and the abundance of food resources has led to the proposal that the area should be designated as critical habitat for wintering eiders (USFWS, 1998; <http://endangered.fws.gov/i/b7y.html>).

The waters within 0.25-mile of Kodiak have come under consideration as critical habitat for wintering/feeding for the species (March 13, 2000; 65 FR 13262). A total of 1,344 km^2 of federally- and state-controlled coastline around Kodiak Island are proposed for listing. The proposal emphasizes the importance of coastal areas in southwestern Alaska as habitat for feeding and molting.

The designation of critical habitat requires that federal agencies insure that actions they fund, permit or carry out are not likely to result in the destruction or adverse modification of critical habitat that would appreciably diminish the value of the habitat for the survival and recovery of a listed species. Activities that have the potential to modify critical habitat that are listed in the Federal Register are:

- Draining, filling or contaminating wetlands.
- Filling, dredging, or pipeline construction in coastal marine waters.
- Commercial fisheries that could damage benthic or planktonic flora and fauna.
- Spilling or discharging hazardous substances.
- Discharge of sediment containing toxic substances into freshwater systems that drain into adjacent nearshore marine waters.

The Steller's eider is not endangered throughout its range. Only the Alaskan breeding population, which has been in decline for most of the last century due to hunting pressure and habitat modification, is listed (June 11, 1997, 62 FR 31748). In the vicinity of Kodiak Island, this population mixes with migrants from Russia, which are not considered endangered. The two populations are visually indistinguishable. There are complex technical issues associated with developing a recovery plan for a sparsely-distributed population that is difficult to distinguish from other populations. It is therefore not surprising that a recovery plan for the Alaskan Steller's eider has not been published, although a draft is in preparation (USFWS, 1998). At present, the steps required to preserve the population and insure its recovery are unclear. However, for the purposes of this EA, some concerns are unfounded. First, Steller's eiders do not breed in the vicinity of Kodiak Island, so QRLV launches would not affect breeding. In

addition, primary molting areas in southwestern Alaska lie to the north of the Aleutian chain (Port Moller, Port Heiden, Nelson Lagoon, Izembek Lagoon). Thus, concerns about the effects of QRLV launches on activity of molting eiders should be minimal.

3.4.6.4 Short-Tailed Albatross

On November 2, 1998, the USFWS proposed to extend endangered status for the short-tailed albatross to include the species' range within the United States. It is now listed as an endangered species at both the federal (July 31, 2000; 65 FR 46643-46654) and state levels.

Short-tailed albatrosses range throughout the North Pacific Ocean and north into the Bering Sea during the non-breeding season. Although sightings are rare, they are seen in the summer along the Aleutian Chain, in the Bering Sea and in the Gulf of Alaska. Several have been sighted along Kodiak Island, including the vicinity of Narrow Cape (Sherburne, 1993). Originally numbering in the millions, the worldwide population of breeding-age birds is currently approximately 500 individuals, and the worldwide total population is less than 1,000 individuals. Overexploitation caused most of the decline of the species - it is estimated that 5 million were killed in the Japanese feather trade. Even in the presence of complete protection, the future of the species is uncertain as a result of demographic or genetic vulnerability due to low population size and limited breeding distribution. Under these conditions, the survival of each individual is important. While exploitation ceased with protection in the 1940s, some anthropogenic dangers remain, such as entanglement in longlines, plastics ingestion, exposure to contaminants and airplane strikes (in the vicinity of breeding areas).

3.4.7 ESSENTIAL FISH HABITAT

In addition to compliance with the National Environmental Policy Act (1969) (NEPA), actions authorized by federal agencies are required to address Essential Fish Habitat (EFH), as mandated by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (50 CFR 600.905 et seq.). EFH is defined to include the waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. The National Marine Fisheries Service (NMFS) is responsible for evaluating potential impacts and enforcing the provisions of the MFSCMA. Federal agencies that fund, permit or carry out activities that may negatively affect EFH, including Habitat Areas of Particular Concern (HAPC), are required to consult with NMFS and each regional Fishery Management Council (FMC) regarding potential adverse effects of their actions on EFH. This EA is the mechanism for this consultation.

At present, no species of freshwater or marine fish or invertebrates is listed as endangered, threatened, or as a species of concern in the vicinity of Kodiak Island. The NMFS identifies EFH using the best information available to insure that areas necessary to all life stages of identified species will be preserved. The EFH designation is intended largely to mitigate the impact of fisheries on commercially-important species, prey or predators of these species, and species taken incidentally by fisheries. However, the law also applies to activities other than fishing.

The species managed by the North Pacific Marine Fisheries Council (NPMFC) and their associated EFH (Habitat Conservation Division, 2000) were considered for this assessment. Areas considered were in the vicinity of Narrow Cape and along the trajectory within 60 seconds of launch - these are the nearshore and inner-shelf habitats that might be vulnerable to falling debris or toxic propellant. The remainder of the trajectory occurs over pelagic waters, where dropping of spent stages and the small amount of propellant remaining after launch would not significantly impact habitat or fish.

Table 3-1 summarizes the species managed in the vicinity of Narrow Cape or along the first approximately 25 km of the launch trajectory. The EFH includes not only areas used by adults of a given species, but also areas occupied by eggs, larvae and juveniles of various stages. The species of interest include salmon, groundfish (mainly pollock, flatfish, and sebastids), crabs, and the weathervane scallop, as well as species of small commercial importance likely to be taken incidentally in nets or trawls, particularly sculpins (*Hemilepidotus* spp., *Myoxocephalus* spp). Other species, such as sharks and skates, are likely to be taken incidentally, but are not known to concentrate in the area of interest. The EFH designations also include prey species important to fishes of commercial importance; typically, concentrations of these species are poorly known and adequately indicated by the presence of concentrations of their predators.

Most species are widely distributed. For example, the flathead sole extends its range southward along the west coast of the United States to California. The majority use the waters of the inner, middle and outer continental shelf, or pelagic waters both north and south of the Aleutian chain. Thus, the habitat around Kodiak Island represents a very small portion of their range and of the EFH identified for them. Those species that depend on nearshore waters in the vicinity of the launch site, or the canyons and shelf break just offshore of it, are indicated in Table 3-1.

The NMFS also defines portions of EFH that are Habitat Areas of Particular Concern. These are sites that are both vulnerable to physical damage or degradation from human activities or pollutants, and susceptible to exposure to such threats. The HAPC include anadromous streams, lakes and other freshwater areas used by Pacific salmon and other anadromous fish (e.g., smelt),

TABLE 3-1
ESSENTIAL FISH HABITAT
IN VICINITY OF KLC

SPECIES	EFH AGE CLASS: LEVEL	KNOWN SEASONAL CONCENTRATIONS NEAR THE LAUNCH SITE OR NEARSHORE TRAJECTORY
Groundfish		
Walleye Pollock (*Theragra calcogramma*)	***Eggs***: 1, ***Larvae***: 1, ***Early Juveniles***: 1, ***Late Juveniles***: 1, ***Adults***: 2	Spawning concentrations occur on the east side of Kodiak in late winter, with peak spawning in March. The greatest abundance of adults occurs at depths < 300 m; most eggs at depths 150-200 m; adults are fished off Kodiak Island and in Shelik of Strait during 3 seasons (January, June, September).
Pacific cod (*Gadus macrocephalus*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	Known concentrations of this species, especially late juveniles, occur to the south of Kodiak Island from the 100 to the 1000 ft isobath.
Yellowfin sole (*Limanda aspera*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	There are known concentrations of juveniles in nearshore bays on the south side of the island, including Ugak Bay and the waters around Ugak Island; adults are benthic and spawn December to March, but with highest concentrations in other areas; fish dependent on bottom invertebrates; adults migrate to other areas during summer and fall.
Flathead sole (*Hippoglossus elassodon*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	This is a very widely distributed species; there is a known concentration off Narrow Cape, extending to the shelf break (1000 ft isobath); spawning occurs in mid- to outer-shelf areas March-April; juveniles remain in shallow waters.
Dover sole (*Microstomus pacificus*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 0a, ***Adults***: 1	This is a widely-distributed deep-water species. It is not concentrated near the coast near Narrow Cape.
Rock Sole (*Lepidopsetta bilineatus*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	This is a very widely distributed species; however, there are concentrations of rock sole in shallow water to the south of Narrow Cape
Rex sole (*Glyptocephalus zachirus*)	***Eggs***: 0a, ***Larvae***: 0a, ***Juveniles***: 0a, ***Adults***: 1	This is a widely-distributed deep-water species. It is not concentrated near the coast near Narrow Cape.
Arrowtooth flounder (*Atheresthes stomias*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	Larvae used nearshore bays during spring and summer. They are dependent on phyto/zooplankton. Adults use nearshore bays to some extent.
Atka mackerel (*Pleurogrammus monopterygius*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 0a, ***Adults***: 1	Adults occur in large, localized aggregations in areas with strong current; they become demersal in shallow water during spawning, although most of the year is spent in pelagic waters. Spawning peaks June-September; there is no fishery off Kodiak now.
Sablefish (*Anoploma fimbria*)	***Eggs***: 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	This is a widely-distributed deep-water species. It is not concentrated near the coast near Narrow Cape.
Pacific Ocean perch (*Sebastes alutus*)	***Eggs***: -, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 0a, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation
Shortraker rockfish (*S. borealis*)	***Eggs***: -, ***Larvae***: 0b, ***Early Juveniles***: 0a-b, ***Late Juveniles***: 0b,1, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation
Rougheye rockfish (*S. aleutianus*)	***Eggs***: -, ***Larvae***: 0b, ***Early Juveniles***: 0a-b, ***Late Juveniles***: 0b,1, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation

TABLE 3-1
ESSENTIAL FISH HABITAT
IN VICINITY OF KLC
(Continued)

SPECIES	EFH AGE CLASS: LEVEL	KNOWN SEASONAL CONCENTRATIONS NEAR THE LAUNCH SITE OR NEARSHORE TRAJECTORY
Northern rockfish (*S. polyspinus*)	***Eggs***: -, ***Larvae***: 0b, ***Early Juveniles***: 0b, ***Late Juveniles***: 1, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation
Dusky rockfish (*S. ciliatus*)	***Eggs***: -, ***Larvae***: 0b, ***Early Juveniles***: 0b, ***Late Juveniles***: 1, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation
Yelloweye rockfish (*S. ruberrimus*)	***Eggs***: -, ***Larvae***: 0b, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 1	No EFH for eggs; internal fertilization/incubation; concentrations of young juveniles observed in rocky, high-relief areas close to shore, including canyon off Narrow Cape.
Thornyhead rockfish (*Sebastolobus* spp.)	***Eggs***: 0a, ***Larvae***: 0a, ***Juveniles***: 0a, ***Adults***: 1	Eggs found in gravel, rock, and kelp in shallow water; passages between islands in the vicinity of Kodiak; spawning occurs nearshore in rocky areas and in kelp in summer/early fall.
Sculpins (*Hemilepidotus* spp., *Myoxocephalus* spp.)	***Eggs***: 0a, ***Larvae***: 0a, ***Juveniles***: 0a, ***Adults***: 1	Some species deposit eggs in rocky shallow waters inshore; adults found into the intertidal in various substrates
Forage species	***Eggs***: 0a-c, ***Larvae***: 0a-c, ***Juveniles***: 0a, ***Adults***: 0a	Information about EFH of forage species sketchy; euphausids concentrate in upwelling/nutrient rich areas, such as the heads of submarine canyons, and may therefore occur close to shore in the vicinity of Ugak Bay. Pholids and stichaeids use eelgrass beds as juveniles and adults.
Scallops		
Weathervane scallop (*Patinopectin caurinus*)	***Eggs:*** 0a, ***Larvae***: 0a, ***Early Juveniles***: 0a, ***Late Juveniles***: 1, ***Adults***: 2	Especially high densities of this species are found off Kodiak Island. Abundance greatest between 40-130 m in mud, clay, sand, and gravel. They spawn May-July. Kodiak is now closed to the trawl fishery.
Crabs		
Red and Blue King Crab (*Paralithoides camtschatica, P. platypus*)	***None determined***	The red king crab is the most abundant and most commercially important. Major concentrations of the red king crab are located near Kodiak Island. Isolated populations of the blue king crab occur around Kodiak as well. Juveniles and small adults are found inshore (< 300 ft depth) and in protective cover (including kelp beds). Juveniles aggregate in dense "pods". Around Kodiak, clams are a major prey item. Adult red king crabs breed and molt in very shallow water as a defensive measure, in kelp and along rocky shorelines. Females molt and mate February-April in the Kodiak area (Nickerson 1965). The female carries the developing eggs and larvae for 11 months.
Tanner Crab (*Chionoecetes bairdi)*	***None determined***	Concentrations occur around Kodiak. Smaller crabs use water as shallow as 60 ft. They breed January-May in the area. Eggs are retained 11-12 months. Release coincides with plankton blooms in the spring. Adults move limited distances (off Kodiak, 15 mi on average).

TABLE 3-1
ESSENTIAL FISH HABITAT
IN VICINITY OF KLC
(Continued)

SPECIES	EFH AGE CLASS: LEVEL	KNOWN SEASONAL CONCENTRATIONS NEAR THE LAUNCH SITE OR NEARSHORE TRAJECTORY
Golden King Crab (*Lithodes aquispina*)	***None determined***	Least abundant king crab; confined to deep water.
Dungeness Crab (*Cancer magister*)	***None determined***	Widespread; concentrated around Kodiak Island. Eggs are carried by the female 8 to 10 months before slowly dispersing as larvae. Larvae are found inshore February-May, often in eelgrass or masses of kelp. Adults migrate inshore in the early spring and stay through summer.
Salmon		
Chinook (*Onchorynchus tshawytscha*)	***Eggs/Larvae***: 1-2, ***Juveniles (fresh water)***: 1-2, ***Juveniles (estuarine)***: 1, ***Juveniles (marine)***: 1, ***Adults/Immature (marine)***: 1-2, ***Adults (fresh water)***: 1-3	Found in Pasagshak River summer and fall.
Coho (*O. kisutch*)	***Eggs/Larvae***: 1-2, ***Juveniles (fresh water)***: 1-2, ***Juveniles (estuarine)***: 1-2, ***Juveniles (marine)***: 1, ***Adults/Immature (marine)***: 1-2, ***Adults (fresh water)***: 1-2	Found in Pasagshak River summer and fall.
Pink (*O. gorbuscha*)	***Eggs/Larvae***: 1-2, ***Juveniles (fresh water)***: 1-2, ***Juveniles (estuarine)s***: 1-2, ***Juveniles (marine)***: 1-2, ***Adults/Immature (marine)***: 1-2, ***Adults (fresh water)***: 1-3	Found in Pasagshak River summer and fall. There is a major fishery off Kodiak. Juveniles move into marine environment in summer and fall.
Sockeye (*O. nerka*)	***Eggs/Larvae***: 1-3, ***Juveniles (fresh water)***: 1-4, ***Juveniles (estuarine)s***: 1-2, ***Juveniles (marine)***: 1-2, ***Adults/Immature (marine)***: 1-2, ***Adults (fresh water)***: 1-3	Found in Pasagshak River summer and fall.
Chum (*O. keta*)	***Eggs/Larvae***: 1-3, ***Juveniles (fresh water)***: 1-2, ***Juveniles (estuarine)s***: 1-2, ***Juveniles (marine)***: 1-2, ***Adults/Immature (marine)***: 1-2, ***Adults (fresh water)***: 1-3	Juveniles dependent on estuarine habitat in spring, early summer. Juveniles present in coastal waters near Kodiak July – October; move south into North Pacific.

TABLE 3-1
ESSENTIAL FISH HABITAT
IN VICINITY OF KLC
(Continued)

NOTES:

NMFS/STATE OF ALASKA LEVEL DESIGNATIONS:
These levels indicate the quality of the information available on each managed species at the time EFH designations were determined.

Level 0: No systematic sampling
Level 0a: Some information on a species' life stage upon which to infer general distribution
Level 0b: No information on life stage, but some information on similar species or adjacent life state from which to infer general distribution
Level 0c: No information on life stage, similar species or adjacent life stages; complexity of species stock structure prohibited inference of general distribution
Level 1: Presence/absence distribution data are available
Level 2: Habitat-related densities of the species are available
Level 3: Growth, reproduction or survival rates within habitats are available; for salmon, knowledge is available for some stream systems that have been intensively studied, such as the Situk river.
Level 4: Production rates are available by habitat; for salmon, knowledge is available for some stream systems that have been intensively studied, such as the Situk river.

SOURCE:

Habitat Conservation Division. EFH Environmental Assessment – Habitat Conservation Division, NMFS, Alaska. The entirety of this document may be obtained at http://www.fakr.noaa.gov/habitat/efh_ea/toc.htm. 2000.

State of Alaska Department of Fish and Game, Habitat Division, Juneau. Alaska Habitat Management Guide, Southcentral Region, Volume 1: Life Histories and Habitat Requirements of Fish and Wildlife. Alaska Department of Fish and Game. 1985.

Technical Team for Essential Fish Habitat. Essential Fish Habitat Assessment Report for the Salmon Fisheries in the EEZ off the Coast of Alaska. Prepared by Alaska Department of Fish and Game, National Marine Fisheries Service, North Pacific Fishery Management Council and compiled by the Technical Team for Essential Fish Habitat for the Salmon Fisheries off the Coast of Alaska. Published by the North Pacific Fishery Management Council. March 31, 1998.

And the following official URL: http://www.fakr.noaa.gov/habitat/efh_ea/

especially in areas adjacent to intensive human-induced activities. The nearest such stream to the QRLV launch site, the Pasagshak River, is 10 km (6 miles) northwest of the launch facility and, therefore, outside the zone likely to be impacted by launch failure.

Finally, there is a managed population of introduced rainbow trout in East Twin Lake (Schwarz, 1993; FAA, 1996), which lies within the Safety Exclusion Zone for KLC. This population is artificially stocked by the Alaska Department of Fish and Game.

3.5 AIR RESOURCES

3.5.1 CLIMATOLOGY AND AIR QUALITY

The KLC is within a climatic area characterized as maritime, with long, mild winters and short, cool summers, with average temperatures ranging from minus 1 degree Centigrade (C) (32 degrees Fahrenheit [F]) during the winter to 15.6 degrees C (60 degrees F) during the summer. Prevailing winds are from the northwest, with average annual wind speed of 4.9 meters per second (m/s)(10.9 miles per hour [mph]). Winter-type weather usually occurs from November through March, when the greatest average monthly snowfalls occur, ranging from 36 centimeters (cm) (14 inches) in December to 46 cm (18 inches) in February (FAA, 1996).

Heavy fog, with visibility of one-quarter mile or less, typically occurs 1 day per month, with the highest incidence in July when fog occurs an average 3 days per month. High winds occur throughout the year, with peak gusts ranging from 16 m/s (35 mph) in June to 37 m/s (83 mph) in December (FAA, 1996).

Kodiak Island is classified as a Class II attainment area, as it is within a larger area that is in attainment with the National Ambient Air Quality Standards (NAAQS). Wind-blown volcanic dust is the primary air contaminant on the island. The atmosphere is classified as neutral (D stability) for the dispersion of air pollutants. Human activities in the vicinity of KLC that would affect background air quality are ranching, occasional vehicular traffic, the occasional operation of two standby generators at the U.S. Coast Guard Loran-C Station, and periodic use of KLC for vehicle launches (FAA, 1996).

3.5.2 LOWER AND UPPER ATMOSPHERE

For the purpose of this EA, "lower atmosphere" refers to the troposphere, which extends from the ground surface to an altitude of approximately 15 km. "Upper atmosphere" refers to the

stratosphere, which extends from 15 km to approximately 40 km. The stratosphere contains the Earth's ozone layer and varies as a function of latitude and season. Hundreds of chemical reactions are involved in maintaining and depleting the Earth's stratospheric ozone layer. Some of these atmospheric reactions can be affected by the addition of certain chemicals from launches.

The launches of *ait*-1 and *ait*-2 did not result in changes to the air quality of Kodiak Island (see Section 4.5 - Air Resources).

3.6 NOISE

Based on land use in the Narrow Cape area, the most common man-made noise is from occasional traffic on the road from Kodiak to Narrow Cape, from nearby off-road recreational vehicles and, intermittently, from standby generators at the nearby U.S. Coast Guard Loran Station. Sensitive receptors from activities at KLC are located at Kodiak Ranch (the nearest residence), a distance of 3 km (2 miles), Church Camp (the nearest business), a distance of 5 km (3 miles), and Pasagshak State Recreation Area (the nearest public facility), a distance of 10 km (6 miles) (FAA, 1996) (see Figure 2-1).

Ambient noise in the vicinity of KLC was measured on September 15, 1999, during monitoring for the *ait*-2 launch (Bowles, 2000a). Ambient noise was measured on the day preceding the launch and day of the launch, with hourly Leq values (hourly average sound levels) of 43 to 55 dBA under quiet (windless) conditions (Bowles, 2000a). Noise samples (1/32/s) exceeding 70 dBA sound pressure level (SPL) were rare (0.6 percent of samples under relatively windless conditions). During the 19-hour period when noise events exceeding a threshold of 70 dBA SPL for more than 30 seconds were monitored on Ugak Island, 15 events were detected. All were associated with aircraft, including helicopters, a survey aircraft, and noise from the launch. Most were the result of helicopter landings on the island (ENRI, 2000).

The launches of *ait*-1 and *ait*-2 produced transitory noise effects. Overall, ambient noise levels were not affected (see Section 4.4 - Biological Resources; Section 4.6 - Noise).

3.7 LAND USE AND RECREATION

Land use on Kodiak Island consists primarily of the town of Kodiak and adjoining U.S. Coast Guard Station, Kodiak Harbor and airport, and the Kodiak National Wildlife Refuge, which

occupies approximately the southwest one-half of Kodiak Island. Much of the remainder of the island remains undeveloped or is utilized for rural recreational, residential and business uses. The area where KLC is located, Narrow Cape, is rural, traditionally and currently used for ranching and recreation. The U.S. Coast Guard 190-m (625-foot) Loran-C navigation transmitter station is within the 3,100-acre KLC. A small number of ranch-related structures and a summer church camp are nearby. The Pasagshak State Recreation Area is located approximately 10 km (6 miles) west of KLC (FAA, 1996).

Kodiak Island provides extensive outdoor recreational opportunities that include fishing, hunting, hiking, camping, boating, beachcombing, and wildlife and scenic viewing. Recreation activities occur year-round, peaking during the summer months. Recreational opportunities include 15 designated facilities owned by the Kodiak Island Borough, three state parks, and the National Wildlife Refuge. At Narrow Cape, fishing occurs at the Pasagshak Recreation Area and at East Twin Lake, which is within the boundary of KLC. Sportfishing for halibut occurs in the area around Ugak Island. Hunting in the vicinity of KLC focuses on Sitka black-tailed deer during the summer and fall. In addition, a nearby ranch offers for-fee bison hunting and horseback riding (FAA, 1996).

Land use includes occasional use of KLC for rocket launches and temporary closures of the area associated with those launches. These effects have become a part of the existing environment, with no other changes to land use or recreation in the area.

3.8 SOCIOECONOMICS

3.8.1 GENERAL CHARACTERISTICS

The Kodiak Island Borough had a 1993 population of approximately 15,000, which included about 2,000 persons at the U.S. Coast Guard Station. The population is concentrated in the City of Kodiak, where about one-half of the population resides, and in other, smaller population centers along the roadway within the northeastern portion of the island and in the traditional villages of Port Lions, Ouzinkie, Old Harbor, Akhiok, Karluk and Larsen Bay. The rest of the island is largely uninhabited.

The population is about two-thirds white and one-third non-white. The largest non-white population is Aleut (approximately 12 percent), and the second largest non-white population is Asian or Pacific Islander (approximately 11 percent). The remaining population is Black, American Indian, Eskimo and others (FAA, 1996).

The largest employment sector on the island is seafood processing and harvesting, with approximately 41 percent of total employment. The second largest sector is government, which accounts for about 25 percent of total employment. The largest government employer is the U.S. Coast Guard. Other key employment sectors are logging and tourism. In 1994, Kodiak had an average 11.9 percent unemployment, compared to the statewide average of 7.8 percent. This may be related to the commercial fishing industry, where the value of the Kodiak Island Borough fishery catch dropped from $103 million in 1992 to $86 million in 1994 (FAA, 1996).

There are more than 4,400 residential units in the Kodiak urban area, with more than 260 rooms available in hotels, motels and other accommodations. The estimated annual vacancy rate is 45 to 50 percent (FAA, 1996). Kodiak has a modern 44-bed hospital (Stuteville, 2000), and the Kodiak Area Native Association contracts with the Bureau of Indian Affairs to provide health care services to Native Americans. Kodiak City provides water and sewer in and around its boundaries. Electricity is provided by the Kodiak Electric Association (FAA, 1996).

The socioeconomic consequences of the *ait*-1 and *ait*-2 launches have become an integral aspect of the existing environment, providing a small amount of diversity to the socioeconomic characteristics of Kodiak Island.

3.8.2 ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their activities on minority and low-income populations. Based on the characteristics of the proposed action, the potentially affected community is the entire Kodiak Island Borough. Census data show the borough population of approximately 15,000 as 30.2 percent minority (non-white) and Kodiak City as 36.7 percent minority. Approximately 57 percent of the borough's total minority population resides in Kodiak City. There are six traditional villages on the island, considered minority communities under the Executive Order. The population of these villages is more than 83 percent Native American, predominantly Aleut (FAA, 1996).

Approximately 5.5 percent of the borough's population is considered in poverty; poverty status data for census tracts and block groups is not available. Median household income is available for block groups and can be used as an indicator of community income status. The two block groups that comprise the southern portion of Kodiak Island (including the traditional villages of

Old Harbor, Akhiok, Larsen Bay and Karluk) have median household incomes of $33,000 and $21,667, compared to median household income of $44,815 for the Kodiak Island Borough as a whole (FAA, 1996).

3.9 VISUAL RESOURCES

Scenic values in the vicinity of KLC at Narrow Cape are high. Natural values dominate, with low, grass-covered mountains that level to flatlands near the shore. The mountains are covered with wildflowers in season, with patches of Sitka spruce, alder and willow. Bedrock beaches border Narrow Cape, and barrier beaches and lagoon systems dominate the eastern shoreline. Man-made structures in the area consist of those associated with KLC operations (Launch Control and Management Center, Payload Processing Facility, Integration and Processing Facility, Spacecraft Assemblies Transfer, and Launch Pad and Service Structure), the U.S. Coast Guard 190-meter (625-foot) Loran-C transmitter tower and associated buildings, a small number of ranch-related structures, and one complex of concrete bunkers associated with World War II activities (FAA, 1996).

The launches of *ait*-1 and *ait*-2 produced transitory visual effects, primarily associated with the launch plume. The overall scenic value of the area was not affected.

3.10 CULTURAL RESOURCES

On Kodiak Island, archaeological and traditional use sites are fairly well distributed along the coast, concentrated along major bays and fish streams. Historical sites are related to Russian occupation, the period of transition to American governance, and defense facilities built during World War II. Subsistence is an aspect of social, cultural and economic life on Kodiak Island, especially in the isolated traditional villages. A small number of residents from Old Harbor use the coastal and adjacent inland areas around Narrow Cape for subsistence. However, much of the Narrow Cape area is used as a working ranch, which gives primacy on the site to the rancher (FAA, 1996).

There are two archaeological sites and one historic World War II-era bunker complex in the vicinity of the KLC launch site. The exact locations of the archaeological sites are maintained as confidential to prevent unauthorized access. The World War II complex consists of reinforced concrete bunkers used as lookout posts (FAA, 1996).

Cultural resources were not affected by the launches of *ait*-1 and *ait*-2.

3.11 HEALTH AND SAFETY

3.11.1 PUBLIC HEALTH AND SAFETY

Issues of public health and safety are related to preflight transport and storage of missile components, missile launch and missile flight. The regulatory environment consists of existing regulations and practices established to minimize or eliminate potential risks to the general public. These include, but are not limited to, Department of Transportation (DOT) regulations and USAF procedures for the transport of hazardous materials, Department of Defense (DoD) procedures for handling explosives, and the DoD Range Safety program for the processing and launch of missiles (USAF, 1997).

The DoD Range Safety program is utilized to determine areas that will be evacuated for each launch to assure that the public is not exposed to unacceptable levels of risk, that physical security and safety measures can be enforced, and that adverse environmental effects are minimized. The population of concern for the proposed action consists of persons in the vicinity of KLC, U.S. Coast Guard personnel who periodically work at the Loran-C Station, members of the public who utilize the KLC area for recreation, and residents of eastern Kodiak Island, including Kodiak City and the U.S. Coast Guard Station (USAF, 1997).

3.11.2 RANGE SAFETY PROCEDURES

Standard range safety procedures for the USAF QRLV Program will be conducted in accordance with regulations established for Sea Test Ranges at the Naval Air Warfare Center Weapons Division (NAWCWPNS), Point Mugu, California. These procedures provide for flight safety, range clearance and surveillance, commercial air traffic control, and ground safety. They include published Notices to Airmen and Notices to Mariners, as well as coordination with the FAA and U.S. Coast Guard. The NAWCWPNS will assure that all aspects of safety are covered, including transport of hazardous materials (i.e., solid rocket motors), handling of the rocket motors once they arrive at KLC, operations at the launch site, flight safety and radio frequency interference.

During launch preparation, ground safety at KLC will be the responsibility of NAWCWPNS, with assistance provided by USAF personnel. Safe operating procedures will be followed in accordance with DoD Explosives Safety Standard 6055.9 and NAVSEA OP 5, Volume 1, *Technical Manual for Ammunition and Explosive Ashore, Safety Regulations for Handling,*

Storage, Production, Renovation and Shipping. During launch, procedures call for various contingency measures to be in effect, such as the following:

- Rocket Motor Mishap: An Explosive Ordnance Disposal Plan (EOD) will be in place, with appropriate personnel and equipment.
- Fire: A firefighting crew will be in place during launch countdown. This will be a Kodiak Island public firefighting crew, procured through a USAF contract. Additionally, a helicopter with a "honey bucket" for carrying water will be utilized for QRLV launches.
- Injury: An evacuation plan will be in place to transport injured persons to medical facilities (USAF, 1997).

The launches of *ait*-1 and *ait*-2 had no effects related to either public health and safety or range safety issues.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

4.1.1 PROPOSED ACTION

For this analysis, project impacts are based on the launch of one Quick Reaction Launch Vehicle (QRLV) per year from Kodiak Launch Complex (KLC) for a period of eight years, beginning in March 2001. The launch vehicles assessed are QRLV-1, -2, -3 and -4, as described in Chapter 2.0. Potential impacts consist of changes to the natural and human environments that result from pre-launch, launch and post-launch activities associated with launching a QRLV vehicle one time per year for eight years. It is expected that impacts primarily will be associated with launch emissions and noise. Based on the two previous launches from KLC (*atmospheric interceptor technology* [*ait*]-1 and *ait*-2), which did not result in significant impacts, it is expected that impacts from the proposed action also would be less than significant. The following sections present an analysis and evaluation of potential impacts that may occur as a result of the proposed QRLV Program.

4.1.2 CUMULATIVE LAUNCH RATES

The U.S. Air Force (USAF) proposed action for the QRLV Program is one launch per year for a period of eight years, beginning in March 2001. The USAF understands that the U.S. Army also is proposing to embark on a program to conduct vehicle launches from KLC, and that the U.S. Army will prepare an Environmental Assessment (EA) for its program. The U.S. Army plans a North Pacific Targets Program, which will include the launch of four vehicles per year from KLC for a period of 5 years. Additional information is available by contacting Mr. Tom Craven, as follows:

By mail:	U.S. Army Space and Missile Defense Command, SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801
By facsimile:	USASMDC SMDC-EN-V 256.955.5074
Website:	<http://www.huntsville.edaw.com/northpacific>

In addition, the National Aeronautics and Space Administration (NASA) plans to implement the Kodiak Star Program, which involves the launch of one Athena rocket from KLC during August 2001. Additional information is available by contacting Mr. George Diller, as follows:

By phone:	321.867.2468
Website:	<http://www-pao.ksc.nasa.gov/kscpao/>

Depending on when the U.S. Army program is implemented, the number of launches from KLC in 2001 could range from a minimum of two launches (1 USAF, 1 NASA) to a maximum of six launches (1 USAF, 1 NASA, 4 U.S. Army).

The EA prepared by the Federal Aviation Administration (FAA) analyzed up to nine launches per year for a period of 22 years. The one QRLV launch per year, one NASA launch in 2001 and the four U.S. Army launches per year are within the cumulative nine launches per year analyzed in the FAA EA (FAA, 1996).

4.2 GEOLOGY AND SOILS

4.2.1 PROPOSED ACTION

Impacts to geology from KLC vehicle launches are not anticipated. There is, however, the potential for impacts to area soils as a result of atmospheric deposition of launch combustion products. These potential impacts are discussed below. The combustion product of potential concern for deposition to the area is hydrochloric acid (HCl). Measurable long-term changes in the pH of soils are not expected from deposition from up to nine launches per year of an LMLV-2 launch vehicle (now the Athena-2) as addressed in the FAA EA (FAA, 1996). As shown in Figure 2-4, the Athena-2 launch vehicle is much larger than any of the four potential QRLV vehicles. As a result, potential HCl deposition for the vehicle analyzed in the FAA EA would be far greater than HCl deposition from the largest vehicle utilized for the QRLV Program (QRLV-4).

Subsequent to the launch of *ait* vehicles, *ait*-1 and *ait*-2, monitoring studies were conducted by ENRI, in accordance with requirements of the Environmental Monitoring Plan (EMP) (see Section 1.2 - Monitoring Requirements). Stream sediment samples were analyzed to evaluate potential toxicity of soils to detect changes in aquatic chemistry attributable to the launches. Results from the *ait*-1 launch revealed evidence of toxicity at one of the nine sites. Based on soil composition, this finding was deemed suspect. The other eight sites revealed no evidence of toxicity (ENRI, 1999). Monitoring results from the *ait*-2 launch revealed no significant difference between the prelaunch and postlaunch samples, thus indicating no toxicity at the eight monitoring points (ENRI, 2000). It is therefore concluded that the two previous launches from KLC did not result in changes to the existing environment relative to geology and soils (see discussion in Section 4.5.1.1 - Lower Atmosphere Emissions).

Based on the above, impacts to geology and soils from the proposed action also would be less than significant.

4.2.2 CUMULATIVE IMPACTS

The potential cumulative impact to geology and soils from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which also were determined to not be significant.

4.2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. Therefore, potential impacts related to geology and soils also would not occur.

4.3 WATER RESOURCES

4.3.1 PROPOSED ACTION

Impacts to water quality could occur from atmospheric deposition of launch combustion products to nearby surface waters and from domestic sewage leaching to ground water. The principal combustion product of concern is hydrogen chloride (HCl) gas, which forms hydrochloric acid when combined with water.

The neutral pH of about 7 in local streams and lakes and their capacity to buffer acid inputs are presumed to be the result of ions that have been carried into the atmosphere with sea spray and subsequently returned in rainfall, a common occurrence in coastal maritime regions. As a result, pH changes from acid deposition are expected to be small and transitory.

Water monitoring studies were conducted by ENRI for the launches of *ait*-1 and *ait*-2 (ENRI, 1999; 2000). Surface water samples were taken, and basic surface water chemistry data were analyzed to detect changes in aquatic chemistry attributable to the launches. Results from the *ait*-1 launch showed physical and chemical water quality measurements (including dissolved oxygen, conductivity, pH, temperature) to be within normal seasonal fluctuations and within the expected ranges for Kodiak Island streams and lakes (ENRI, 1999). Results from the *ait*-2 launch also indicated that physical and chemical water quality data were within expected ranges for Kodiak Island streams and lakes. At the seven sampling locations, normal fluctuations were indicated when compared by season. Temperature data also reflected expected seasonal influences (ENRI, 2000). It is therefore concluded that the two previous launches from KLC did not result in changes to the existing environment relative to water resources. Additional discussion of potential impacts to air

quality is provided in Section 4.5.1.1 - Lower Atmosphere Emissions, and Section 4.5.1.2 - Upper Atmosphere Emissions.

Based on the above, impacts to surface water from the proposed action also would be less than significant.

Measurable impact to the Pacific Ocean is not expected from the QRLV launches. Rocket cases are made of inert materials (aluminum, steel, titanium). However, early termination of a flight would leave some solid propellant in the rocket case or release it as free solid propellant in the ocean. It is expected that early termination would not significantly affect ocean water quality, due to the relatively small amount of propellant released. Related discussion of potential impacts to biological resources is provided in Section 4.4.1.3.2 - Marine Mammals, Section 4.4.1.4.1 - Steller's Eider, and Section 4.4.1.5 - Essential Fish Habitat.

4.3.2 CUMULATIVE IMPACTS

The potential cumulative impact to water resources from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which also were determined to not be significant.

4.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts to water resources from the USAF QRLV Program would not be significant, no impacts would occur under the No Action Alternative.

4.4 BIOLOGICAL RESOURCES

4.4.1 PROPOSED ACTION

Potential impacts to biological resources as a result of the proposed action include those from nominal launch and from potential launch failure. With a nominal launch, potential impacts include vehicle launch emissions, launch-related noise, and sonic boom. In the event of launch failure, potential impacts also include scattered debris, comprised of rocket parts and unspent propellant. In general, impacts from a launch failure would depend on when the failure occurred,

either on the launch pad, during launch or in flight. Since 1995, when the Space and Missile Systems Center, Test and Evaluation Directorate (SMC/TE), was restructured, the success rate for all launches is 100 percent. The corresponding reliability (from a test set of 18/18 successful launches) has been calculated to be 95 percent. As a result, launch failure related to the QRLV Program is unlikely.

Potential impacts are discussed in the following sections as they relate to various terrestrial, aquatic and marine biological resources.

4.4.1.1 Terrestrial Biota

4.4.1.1.1 Vegetation

Impacts to plant life from the QRLV Program could occur from launch vehicle exhaust product deposition. Launch exhaust products include hydrogen chloride (HCl), alumina particles (Al_2O_3), carbon monoxide (CO), carbon dioxide (CO_2) and nitrogen oxides (NO_x). The greatest potential for impacts is from HCl. Direct impacts as a result of HCl deposition to vegetation could include discoloration, partial or complete loss of foliage, and declines in seedling survivorship, seed germination response and seedling emergence. The extent of impact would be a function of weather and behavior of the ground cloud from the launch vehicle (see Section 4.5.1.1 - Lower Atmosphere Emissions).

Impacts to vegetation from scorching are not anticipated. Based on the location and configuration of the launch stool utilized for the QRLV launches, the hot exhaust gases would move downwind from the stool. Based on observation of the *ait*-2 launch, the visible ground cloud would move away from the launch stool in the direction of the prevailing wind and dissipate within minutes. During the *ait*-2 launch, winds were from the southwest at 11.36 miles per hour (mph). At 3 minutes after launch, the visible ground cloud had moved over the Gulf of Alaska. Five minutes after launch, the ground cloud was no longer visible (Lang, 2000).

4.4.1.1.2 Birds

Potential impacts to birds could result from vehicle launch emissions and launch-related noise. Potential emissions resulting from both a nominal launch and launch abort are discussed in Section 4.5.1.1 - Lower Atmosphere Emissions. Launch-related noise is discussed below.

Birds are likely to be exposed to higher levels of launch noise than any other species, as many are coastal in distribution around Narrow Cape. Noise from *ait* launches approached 110

decibels (dB) A-weighted sound exposure level (ASEL) along the coast (Bowles, 2000a), with peak weighted levels reaching 125 dB. The A-weighted levels provide reasonable estimates of effects on birds. No damage to bird hearing is expected as a result of exposure to such launch noise. While formal damage risk criteria for short transients and impulses have not been established for birds, laboratory studies of bird hearing have shown that they are highly resistant to damage (e.g., Dooling and Saunders, 1974) and that they can recover from 'permanent' threshold shifts (PTS) over a period of several months by means of hair-cell regeneration in the cochlea (Corwin and Cotanche, 1988; Saunders et al., 1991).

As a matter of perspective, sound levels produced by the *ait*-2 launch were not high enough to pose a risk to any animal that has been studied. The brief noise peaks produced by the *ait* launches were comparable to levels produced by close-range thunder (120 to 140 dB peak). There is no species known to be susceptible to hearing damage after exposure to this common noise source.

In feeding and molting birds, brief transients such as sonic booms (<500 ms) result in brief avoidance or brief interruption of activities; this effect would only be significant if birds were to be exposed repeatedly in a short period, which will not occur with QRLV launches. Sonic booms pose a risk to incubating birds, which may eject or crush eggs from the nest. Such impacts are not expected in relation to QRLV, as sonic booms from QRLV launches would occur many miles offshore and would not expose known breeding areas to sonic booms. (For example, the sonic boom for *ait*-1, the same vehicle as QRLV-3, occurred approximately 40 miles offshore.)

4.4.1.1.3 Terrestrial Animals

There are no endangered birds or mammals within the safety exclusion zone for the QRLV launches. However, terrestrial birds and mammals may be present during the launches. Those of greatest concern will be the protected bald eagle, protected game animals such as Sitka deer and Kodiak grizzly bears, and domestic animals from nearby ranches that may be grazing in the area. A 7-foot chain link fence and steep topography keep animals away from the launch area. The nearest game trail passes about 250 feet south of the launch stool. Any animals in the vicinity may experience a transient avoidance response to the sight, sound or shock wave from a normal launch. However, the chances of a traumatic injury from such a response have been too small to measure in free-ranging raptors, domestic animals and large mammals, despite repeated efforts to obtain an estimated risk.

The brief noise peaks produced by the *ait* launches were comparable to worst-case levels produced by thunder. There are no species of mammals known to be susceptible to hearing damage after exposure to this common noise source. The only biologically-significant concern for terrestrial species within the safety exclusion zone (see Figure 4-1) should be accidental ingestion of small pieces of solid propellant after a launch failure, either while browsing or after preying on an animal that has eaten chunks of propellant.

4.4.1.2 Aquatic Biota

Impacts to aquatic species could result from rapid pH changes in water, due to launch deposition of HCl. Such impacts are not expected, however, based on anticipated low levels of HCl deposition and the buffering capacity of lakes and streams in the vicinity of KLC (ENRI, 1999; 2000). There is a managed population of introduced rainbow trout in East Twin Lake (FAA, 1996), which lies within the Safety Exclusion Zone for KLC. Solid propellant dropped into this small lake during a launch failure would likely cause mortalities among these fish. This population is artificially stocked by the Alaska Department of Fish and Game.

In the event of a failure, retrieval of propellant would be evaluated on a case-by-case basis, taking safety factors into consideration.

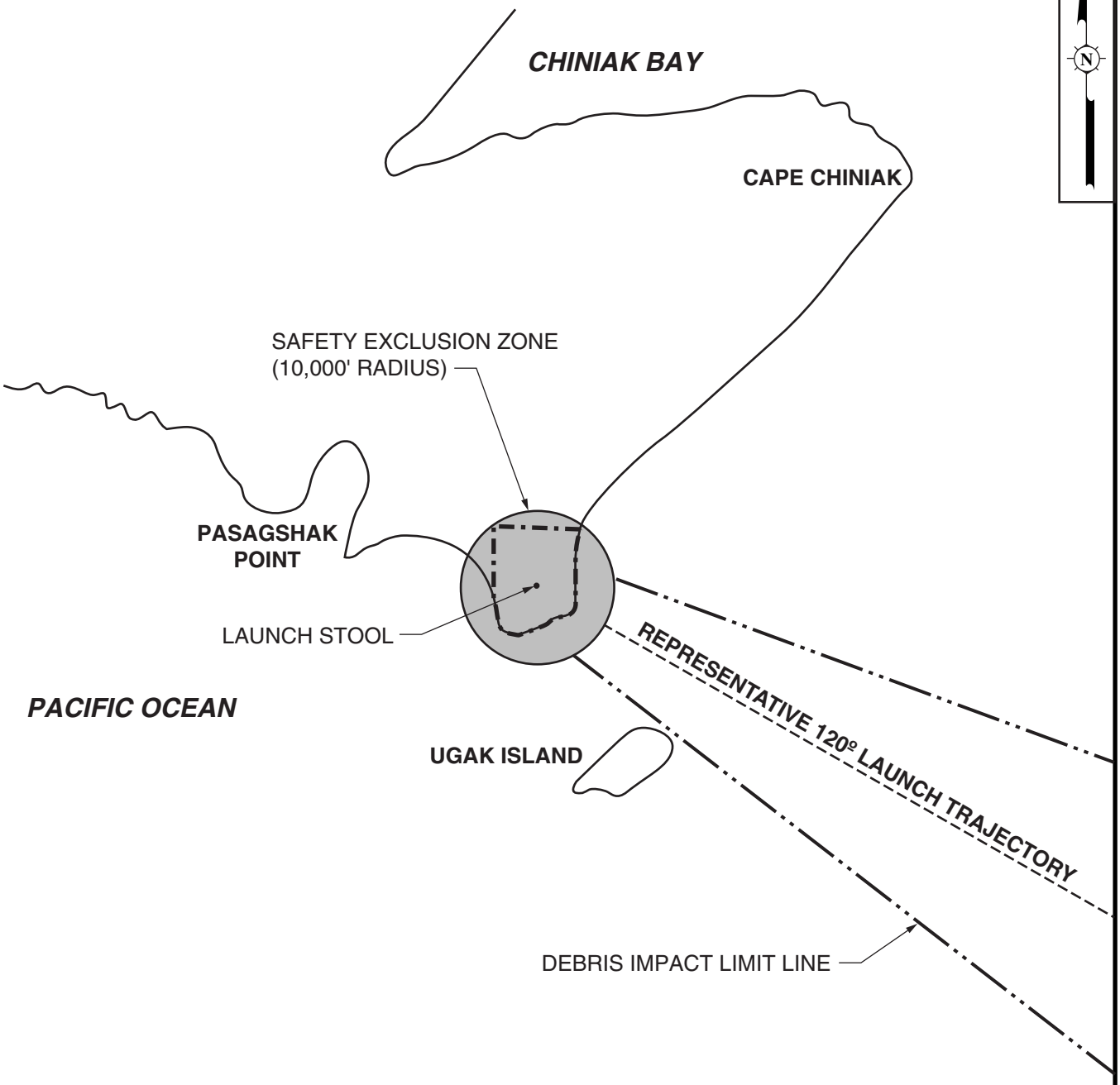
4.4.1.3 Marine Biota

4.4.1.3.1 Marine Birds

Sea ducks, gulls and alcids use the shallow waters of Narrow Cape/Ugak Pass during most months of the year and could be exposed to launch noise up to approximately 110 dB ASEL, depending on the launch vehicle and weather conditions. This noise would startle ducks and seabirds, which would be driven from the area for a period of minutes and then would return. Because QRLV launches would be infrequent (one per year), most seabirds and water fowl would be able to quickly resume a normal pattern of feeding and resting after the launch event.

Consistent with other bird species, there is the possibility that Aleutian terns nesting within several miles of KLC could be driven by launch noise from nest sites for a brief period of time (2 to 4 minutes) (FAA, 1996). However, terns respond to danger aggressively, remaining close to their nests. As a result, their eggs would not undergo significant exposure, either to the elements or to predation.

Potential impacts to the Steller's eider are addressed in Section 4.4.1.4.1 - Steller's Eider.



NOT TO SCALE

LEGEND

KLC SITE BOUNDARY

REPRESENTATIVE SAFETY EXCLUSION ZONE AND DEBRIS LIMIT LINE

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 4-1

4.4.1.3.2 Marine Mammals

Cetaceans

Potential effects on cetaceans include: 1) effects on hearing, 2) significant changes in behavior, and 3) effects on feeding cetaceans in the event of a launch failure. Each of these is considered below.

***Effects on hearing*:** Research on auditory damage in marine mammals is still in its infancy; damage risk criteria have not been established for any species (NMFS, 1998). In addition, almost nothing is known about the auditory capabilities of baleen whales. However, even if filtering by the auditory system is not considered, peak noise levels produced by launches are comparable to exposure levels that have been tested in the bottlenose dolphin (*Tursiops truncatus)* (Ridgway et al., 1999), up to 192 dB (re 1 µPa) in water. While such levels were aversive to the dolphins, they produced no significant harm to their hearing. Baleen whales routinely produce such levels during social interactions (Richardson et al., 1995).

Marine mammals in water will be exposed to noise from rocket launches and sonic booms, particularly when the launch vehicle is directly overhead. Marine mammals receive their greatest noise exposure very close to the surface; at depth, noise levels decay rapidly, even when the sound contains significant low-frequency energy.

Depending on the angle of the launch vehicle, incident pressure at the surface of the water may be elevated by 6 dB due to reflection. Thus, if the worst-case exposure level immediately offshore of the launch site were estimated at 127 dB peak unweighted SPL (the level measured during the *ait*-2 launch just offshore of the launch site; Bowles, 2000a). A conservative estimate of the worst-case exposure can be obtained as follows: 127 + 6 = 133 dB peak SPL. This estimated level is within the range of worst-case exposures to thunder (peaks 120 to 140 dB peak sound pressure level [SPL]), to which animals may be exposed repeatedly as a storm front passes over (compared to a single exposure for a QRLV launch). Because sound levels in water and in air are referenced to different standard levels, 26 dB must be added to levels in air to obtain levels in water. Thus, in-water peak SPL of the worst-case launch noise would be 127 + 6 + 26, or 159 dB SPL. At this level, bottlenose dolphins exhibit behavioral reactions, but do not exhibit distress or temporary threshold shift (TTS) (Ridgway et al., 1997). Although calls of baleen whales frequently exceed this level, it is close to their limit of tolerance to repeated exposures, such as seismic survey impulses (160 dB SPL; Richardson et al., 1995). In this case, the tolerance limit of whales is defined as the point at which 50 percent of a migrant population reacts with short-term avoidance (Richardson, et al., 1995). Based on this information, launch

noise would not have an adverse effect on baleen whales, either above or below the surface of the water. Smaller cetaceans would be less sensitive, as their hearing at low frequencies is even less sensitive than the hearing of a pinniped.

At Ugak Island, launch noise reached 88.4 dB ASEL for the launch of *ait*-1 (the same launch vehicle as QRLV-3) (Stewart, 1999) and 92.2 dB ASEL for the launch of *ait*-2 (the same launch vehicle as QRLV-4) (Bowles, 2000a). Because the QRLV launch vehicles would be the same or smaller than *ait*-2, impacts from QRLV launches are expected to be the same or less than occurred with *ait*-2. Impacts from the QRLV Program would occur one time per year for a period of 8 years. Based on frequency and severity, potential impacts would not be significant.

Behavioral effects*:* Cetaceans commonly dive and alter swim direction when exposed to novel noisy stimuli (Richardson et al., 1995), a likely response for individuals that happen to be near Narrow Cape at the time of launch. This response is actually desirable, as it would protect the animals from falling debris in the unlikely event of a launch failure.

The humpback whale and gray whale use the nearshore waters of Narrow Cape and Ugak Island with seasonal regularity and may spend from four to eight months (late spring through fall) in the waters around Kodiak Island. During migration, gray whales travel near the eastern shore of Kodiak Island. The migratory path takes most of the gray whale population through Ugak Pass, with numbers being highest during the April through May and November through December migration periods. It is recognized that gray whales have recently remained in the immediate vicinity of Narrow Cape outside the migratory period, likely as a result of changes in the prey base after the 1998-1999 El Niño. It is not known whether this behavior will persist as the effects of the 1998-1999 El Niño decline. It is recognized that large aggregations (several hundred individuals) may be observed in offshore waters.

Species-specific studies have showed no behavioral response by gray whales and harbor porpoises to A-6 aircraft on training runs near Sea Lion Rock, Washington, and no effect on humpback whale movement and behavior from low-flying aircraft (FAA, 1996). Similar studies with other types of aircraft have resulted in similar results (Richardson, et al., 1995). These studies provide evidence that noise from rocket launches alone would have little or no impact on cetaceans in Ugak Pass and the surrounding area.

Effects on feeding whales: Feeding or social aggregations could occur in Ugak Bay or in the vicinity of Ugak Island during a launch, and feeding individuals could be exposed to unspent propellant in the event of a launch failure. Of the species in the area, those most likely to be exposed to propellant on the ocean bottom are feeding gray whales and harbor porpoises, with gray whales being the more vulnerable because they feed by taking in large mouthfuls of substrate (Nerini, 1984). The potential effects of such ingestion are not known. However, given the small probability of a launch failure, the subsequent wide dispersal of small amounts of propellant, and the slow leaching of solid propellant, effects are unlikely. Discussion of potential effects to air quality from vehicle launch or abort that could subsequently impact cetaceans in the area is provided in Section 4.5.1.1 - Lower Atmosphere Emissions.

Pinnipeds

Effects on hearing: Some studies of effects of noise on pinniped hearing have been conducted (Stewart, 1998; Bowles et al., 1998). These studies have focused on TTS, and have taken a conservative approach to exposures, never administering levels that would be harmful to humans. None has found PTS or TTS, and they have documented effects of no more than 6 dB (Schusterman et al., 2000). Thus, damage risk criteria for pinnipeds cannot be determined. However, the results of the studies done to date do not suggest significant risk from exposure to QRLV launches.

Sonic booms from QRLV launches are unlikely to cause effects, as they would occur many miles offshore; the sonic boom for *ait*-1 (the same vehicle as QRLV-3) occurred approximately 40 miles offshore. Pinnipeds were exposed to sonic boom peak pressures of up to 6 pounds per square foot (psf) (143 dB peak level) without producing detectable TTS. Even in the vicinity of Narrow Cape, hauled pinnipeds would not be exposed to levels in excess of 110 dB ASEL (124.6 dB unweighted peak), and their insensitivity to low frequencies likely affords additional protection. The duration of exposures at the highest levels is brief - the launch noise peaks lasted but a few milliseconds (ms) (Bowles, 2000a). As a result, occasional exposures to such levels are not expected to affect pinniped hearing.

Behavioral effects: During monitoring for the *ait*-2 launch, various trips to the Ugak Island monitoring site and overflights before and after the launch yielded information regarding behavioral responses of the colony of Steller sea lions at the haulout on the northwest point of Ugak Island. The animals tolerated light aircraft overflights, helicopter approaches within 500 meters (m) and human approach within 100 m without stampeding. It was reported that

many sea lions entered the water shortly before a video monitoring system failed at 9:30 a.m. on the day of the launch. The reason for this activity is not known, although helicopter overflights may have triggered the behavior. As a result of ongoing interagency coordination during preparation for a QRLV launch, the Range Safety organization (NAWCWPNS) has agreed to comply with the request of NMFS that its aircraft maintain a minimum altitude of 1,000 feet when over water and remain at least one-half mile offshore of Ugak Island.

Due to the equipment failure described above, no video was available of sea lion responses at the time of launch, and no direct observations were made. Observers on a helicopter at 1:30 p.m. (after the noon launch) reported that animals were in the water and rafting (congregating tightly in the water in response to being surprised or frightened) and that they continued to raft until at least 3:00 p.m. Given the noon launch time, it is likely that the *ait*-2 launch was at least a contributing factor, if not the triggering event, for the rafting behavior. By the following morning, the colony had fully repopulated its haulout area (Bowles, 2000a).

If the sea lions were stimulated to enter the water or to remain in the water as a result of noise from a QRLV launch, it would not necessarily be a harassment taking under Federal law, and it would not necessarily mean the animals were harmed (NMFS, 2000; Appendix A). Disturbances of this kind, occurring infrequently and unaccompanied by protracted disturbance, are not known to result in abandonment of favored hauling areas, as animals usually return within a day, and often within a few hours of exposure. Because the QRLV launches would be infrequent and transient events, launch-related disturbance would not likely have a biologically significant effect on sea lions outside time-sensitive phases of the breeding season (Bowles, 2000a).

Further, noise from the QRLV launches is expected to be the same as or less than noise from *ait*-2, as the QRLV launch vehicles would be the same or smaller than *ait*-2. As a result, based on observations from the launch of *ait*-2, impacts to the pinnipeds on Ugak Island would not be significant.

The noise of a sonic boom poses a risk to breeding pinnipeds, which may experience interruption of the mother-pup bond. However, the areas impacted by QRLV sonic booms will not encompass breeding rookeries of any species, as the sonic booms will occur over the open ocean many miles offshore. The sonic boom for *ait*-1 (the same vehicle as QRLV-3, the second largest of the QRLV vehicles) occurred approximately 40 miles offshore.

While it is expected that hauled, non-breeding Steller sea lions on Ugak Island will react to the novel stimulus of a launch by entering the water, there is no biologically-significant consequence of this behavior. Sea lions routinely spend long hours in the ocean under all weather conditions, and an occasional additional swim would not produce a detectable effect on their health or energy reserves. Breeding Steller sea lions do not use Ugak Island, so no effect on the mother-pup bond is expected (Bowles, 2000a) (see noise monitoring results for previous launches in Section 4.6.1 - Proposed Action).

Similar responses can be expected from non-breeding harbor seals; hauled harbor seals would be no more vulnerable to QRLV launches than Steller sea lions. However, if launches were to occur during the May to July period, particularly when newly-born harbor seal pups were present on Ugak Island, the chances of mother-pup separation and the breakage of the mother-pup bond could be significant, as pups separated from their mothers are highly vulnerable to starvation, predation, attacks by conspecifics and exposure. It is not possible to estimate the percentage of pups thus affected, as the dynamics of attachment in the presence of remote disturbances, such as launches, are difficult to study. However, because the QRLV launches will occur between February 1 and April 30, mother-pup separation is not expected to be associated with the QRLV Program. The majority of seals haul out along the eastern shoreline of Ugak Island, and Harbor seals pup on the southeast side of the island, away from KLC.

Current evidence for significant mother-pup separation comes from anecdotal evidence collected after light aircraft have been flown at very low altitudes over pupping beaches, causing significant pup mortality (Johnson, 1977; Richardson et al., 1995). However, the number of such incidents is small, and always characterized by close approach.

As a result of ongoing interagency coordination, during preparation for a QRLV launch, the Range Safety organization (NAWCWPNS) has agreed to comply with the request of NMFS that its aircraft maintain a minimum altitude of 1,000 feet when over water and remain at least one-half mile offshore of Ugak Island. Due to these procedures and because the QRLV launches will occur between February 1 and April 30, impacts related to mother-pup separation are not expected to result from the QRLV Program.

4.4.1.4 Sensitive Species

Sensitive species that are known to occur in the vicinity of KLC are addressed below. The following sections evaluate the potential for these species to be adversely affected by activities associated with the proposed QRLV Program and by the cumulative impacts of the QRLV Program plus the proposed NASA and U.S. Army programs.

The sensitive species addressed herein are the Steller's eider, short-tailed albatross, cetaceans and Steller sea lion. Essential fish habitat also is addressed. Based on the analyses, there would not be significant adverse effects to these species from either the proposed action or from the cumulative projects. Details are provided in the following sections.

4.4.1.4.1 Steller's Eider

The important potential impacts on Steller's eiders are: 1) acute effects on the birds themselves (e.g., effects on hearing), 2) possible modification of their use of feeding habitat, 3) modification of feeding habitat, 4) physical impacts due to launch failure, and 5) ingestion of toxins. A previous biological assessment (ENRI, 1998) lists disturbance from launch noise as the primary concern in Steller's eider wintering/feeding areas around Narrow Cape, as it is the singular effect likely during a nominal launch. In the event of a launch failure, there is a small but finite possibility that eiders could experience toxic effects from ingesting small chunks of propellant if a failed vehicle were to break up over shallow water lagoons and feeding areas. Because the propellant is more dense than fresh water or sea water, it would not float, but would sink to the bottom.

Discussion of potential effects to air quality from vehicle launch or abort and potential subsequent impacts to Steller's eider is provided in Section 4.5.1.1 - Lower Atmosphere Emissions. Dispersal of the launch plume is addressed under Visual Resources in Section 4.9.1 - Proposed Project.

Responses to disturbance: In general, ducks and geese are prone to flight responses when disturbed, particularly while on migration or on wintering grounds (Bowles, 1994). Because launch noise close to the coast of Narrow Cape will be sudden and will likely exceed 90 dBA (Bowles, 2000a; Stewart, 1999; ENRI, 1999, 2000; FAA, 1996), there is a high probability that Steller's eiders would respond to launches by diving or with flight for short distances, e.g., over Narrow Cape into Pasagshak Bay or to the northeast toward favored habitat in Chiniak Bay. This response would most likely be compounded by visual and pressure stimuli close to the launch site

during the first few seconds of launch (Bowles, 2000a). It might also be amplified by the presence of aerial predators (e.g., bald eagles) (Ward and Stehn, 1990; Ward et al., 1999).

Two potential biologically significant outcomes of flight have been of concern. First, the eiders might be frightened into abandoning favorable habitat close to the launch site. Second, they might be stimulated into activity that would cost them energetic reserves they had built up over the wintering period. Neither is likely to be significant in the instance of QRLV launches. First, acute responses to noise sources are not known to drive anatids (ducks and geese) from preferred habitat unless they are transients, such as migrants already on their way to other locations. Thus, while birds may fly from one local area to another, there is no evidence that they wholly abandon an area. Second, many birds rapidly habituate to harmless noise sources. Third, once the noise (i.e., perceived danger) is past, birds naturally begin to filter back into the exposed area to regain access to food resources, a strong motivator. This is a natural tactic for coping with predators - after an attack, the probability of encountering a predator again at the same site decreases rapidly over time, while the motivation to feed in a rich area remains strong. Only when a bird is attacked repeatedly at the same site would abandonment be expected.

Thus, while eiders may fly away when the QRLV vehicle launches, such brief disturbances are unlikely to cause them to abandon the area permanently. The ENRI surveys for a surrogate species, the harlequin duck (*Histrionicus histrionicus)*, immediately before and after the *ait*-1 and *ait*-2 launches in 1998 and 1999, showed no detectable decline in abundance (ENRI, 1999; 2000).

There is some evidence that persistent flight responses have the potential to burn valuable energetic reserves. In a series of observations collected on molting sea ducks at Izembek Lagoon, Ward and his colleagues (1989, 1990, 1999, 2000 in press) demonstrated both: 1) persistent flight responses to helicopter overflights in the presence of aerial predators, and 2) the potential for significant and substantial declines in energetic reserves resulting from these persistent responses (Miller et al., 1994). However, these ducks were exposed repeatedly over a period of several months by helicopters transiting across the staging areas on the lagoon. A single overflight would not have produced a detectable effect. Thus, due to the infrequency of QRLV launches, energetic effects would be negligible.

Probability of impact during a QRLV launch: Because individual animals or even groups of individual animals are sparsely distributed, the probability of impact during a launch failure

represents the smallest risk posed by a launch. This can be ascertained by calculating the probability of impact on an area of the appropriate diameter, as illustrated in Table 4-1.

The best information about density and distribution of protected/endangered species near the launch site is available for the threatened Steller's eider, which has been surveyed in the area along the coast of Kodiak Island since 1991. During these surveys, eiders were found around Narrow Cape and in Pasagshak Bay in aggregations of up to 450 birds. In order to demonstrate the probability of impact on flocks of significant size (100 to 500 birds), the known distribution of such flocks and the probability of impact on each during a launch is illustrated in Figure 4-2 and Table 4-1. The probabilities shown are extremely low (0.09% in the worst case); they include the low probabilities of a launch failure. Thus, even if there were multiple groups of animals in the vicinity of the launch, the chances of an impact are negligible. As shown in Table 4-1, the chances of a casualty are even less.

Ingestion of toxins: Off Kodiak, eiders feed by diving and dabbling for mollusks and crustaceans in the shallow water. If, in the event of a launch failure, chunks of solid propellant were to lodge in substrate, marine algae, or marine grass beds in the shoals off Ugak Island or along the shoreline of Narrow Cape, the fallen chunks, toxins leaching from them, or invertebrates containing the toxins might be ingested by eiders. The potential ingestion of toxins by the Steller's eider is considered unlikely based on the following:

- The probability of a launch failure over the course of the 8-year program is small.
- The amount of unspent propellant that could be released into water, even close to the coast, is a small proportion of the total. During an on-pad failure, most propellant would be scattered on land.
- Debris from a launch failure would fall within the Debris Impact Limit Lines represented in Figure 4-1.
- The area over which chunks of propellant would scatter is relatively large.
- The density of eiders in the area is low.

4.4.1.4.2 Short-Tailed Albatross

The combination of sudden loud noise produced by a QRLV launch, the glowing tail of the vehicle, and, possibly, the shock wave, could easily stimulate short-tailed albatrosses in the vicinity of Narrow Cape into flight during a launch. This is a normal defensive response in

TABLE 4-1

PROBABILITY OF PHYSICAL IMPACT TO EIDERS AND EAGLES

LOCATION (site)[1]	BIRD (type)	POPULATION (number of birds)	RADIUS (feet)	AREA (square feet)	LATITUDE (degree)	LONGITUDE (degree)	PROBABILITY OF IMPACT[2]		EXPECTED CASUALTY[3]	
1	Steller's Eider	500	1,000	3,140,000	57.3934	-152.3000	1.60E-04	1.6×10^{-4}	1.90E-06	1.9×10^{-6}
2	Steller's Eider	500	1,000	3,140,000	57.4050	-152.3275	6.50E-04	6.5×10^{-4}	4.40E-06	4.4×10^{-6}
3	Steller's Eider	300	750	1,766,250	57.4397	-152.5001	3.60E-07	3.6×10^{-7}	5.60E-09	5.6×10^{-9}
4	Steller's Eider	300	750	1,766,250	57.4386	-152.4793	5.20E-07	5.2×10^{-7}	8.10E-09	8.1×10^{-9}
5	Steller's Eider	300	750	1,766,250	57.4426	-152.3220	8.80E-02	8.8×10^{-2}	9.70E-04	9.7×10^{-4}
6	Steller's Eider	100	500	785,000	57.4315	-152.3742	6.50E-06	6.5×10^{-6}	6.90E-08	6.9×10^{-8}
7	Steller's Eider	100	500	785,000	57.4565	-152.3216	5.20E-06	5.2×10^{-6}	6.10E-08	6.1×10^{-8}
8	Eagle	10	100	31,400	57.5012	-152.3041	8.60E-09	8.6×10^{-9}	2.80E-10	2.8×10^{-10}
9	Eagle	10	100	31,400	57.4516	-152.3241	2.00E-04	2.0×10^{-4}	3.60E-06	3.6×10^{-6}
10	Eagle	10	100	31,400	57.4229	-152.3489	3.70E-03	3.7×10^{-3}	6.60E-05	6.6×10^{-5}
11	Eagle	10	100	31,400	57.4303	-152.4797	8.50E-09	8.5×10^{-9}	2.40E-10	2.4×10^{-10}
12	Eagle	10	100	31,400	57.4381	-152.5111	5.00E-09	5.0×10^{-9}	1.50E-10	1.5×10^{-10}
13	Eagle	10	100	31,400	57.3885	-152.2635	2.00E-05	2.0×10^{-5}	2.40E-07	2.4×10^{-7}

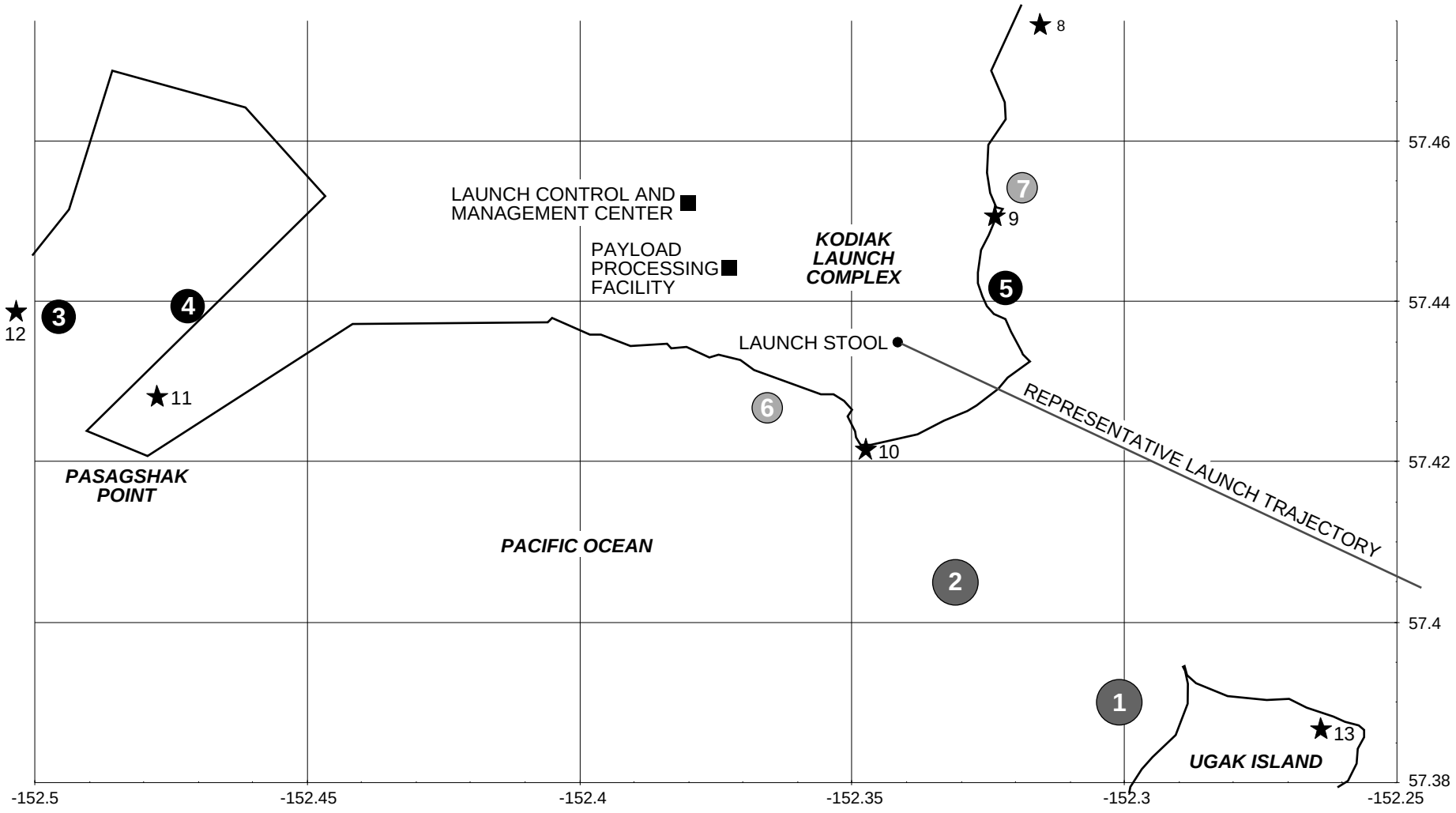
00-194 (1/18/01/kh)

NOTE: Use this table with Figure 4-2.
SOURCE: USAF SMC/TEBI, December 4, 2000.

(1) See Figure 4-2.

(2) Probability that a piece of debris will land within the specified habitat area during a launch. (Probabilities are conservative.)

(3) The chance that a piece of debris would hurt any one bird. Based on 32 square feet, which is the area used for human safety calculations. If the area is reduced to a bird-sized scale (i.e., less than 3.5 square feet) there would likely be a reduction in expected casualty of at least one order of magnitude.



LEGEND

○ STELLER'S EIDER POPULATIONS

★ EAGLE POPULATIONS

SEE TABLE 4-1

SOURCE: USAF, SMC/TEBI, December 4, 2000.

STELLER'S EIDER AND EAGLE POPULATIONS IN VICINITY OF KLC

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 4-2

non-nesting albatrosses when confronted with novel stimuli. However, no negative consequences of such a flight can be envisioned, as the albatross normally ranges very widely, making energetic effects negligible.

Short-tailed albatrosses feed in surface waters over large areas, rather than in shallow water, so they are not bottom-feeding in the area of Narrow Cape. The albatross would be unlikely to encounter debris chunks containing unspent propellant, as the debris would sink away from open surface waters where the albatrosses prefer to feed. Thus, the potential for effects on short-tailed albatrosses from launch failure is negligible. In the event of a coincident occurrence of a launch failure and an albatross in the vicinity at the time of failure, the chances of an interaction with falling debris would be vanishingly small, as it is for other birds (see Table 4-1 and Section 4.4.1.5.2 - Launch Failure or In-Flight Failure).

These birds are extremely rare in the vicinity of KLC, with only a handful of sightings around Kodiak Island since 1947 (ENRI, 1998); only one of these occurred in coastal waters during winter. The albatrosses are least likely to be sighted during the winter and early spring period that encompasses the QRLV launch window (February through April) (Balogh, 1998). Thus, they are not likely to be vulnerable to QRLV launches because they are unlikely to be present when the launches occur. Discussion of potential effects to air quality from vehicle launch or abort is provided in Section 4.5.1.1 - Lower Atmosphere Emissions. Dispersal of the launch plume is discussed under Visual Resources in Section 4.9.1 - Proposed Project.

Based on the 1996 EA for the short-tailed albatross (ENRI, 1996), the potential impact from QRLV launches is limited to noise disturbance from sonic booms. Sonic booms from the QRLV launches will have levels similar to or less than sonic booms from the two previous *ait* launches. Predictions of sonic boom levels were generated for the *ait*-1 program by K. Plotkin, Wyle Laboratories, using the PCBoom3 model (USAF, 1997). The model predicted two footprints for the *ait*-1 vehicle: 1) a crescent-shaped focal region occurring during the ascent phase that first touches down on the ocean surface approximately 46 miles south of the launch, and 2) a descent-phase carpet boom that would strike the region near the splashdown site 1,130 miles south and 200 miles west of Washington state. Levels of this boom were estimated to reach 3.2 pounds per square foot (psf) (138 dB peak) in the vicinity of the point of impact (within 0.3-square mile) (USAF, 1997). Between these two sites, sonic booms would have levels typical of a vehicle in level flight (~2 psf, 134 dB peak).

The ascent-phase focused boom was estimated to have a peak amplitude of 2.7 psf (136 dB peak unweighted level; USAF, 1997) and to cover an area of 34 square miles. Given that the population of short-tailed albatrosses is small (~1,000 birds) and the surface area used by the birds is large (most of the 18 million square miles of the North Pacific), the chances that an albatross would be in the small focal zone for the period of the boom (100 to 300 ms) are small. Even if one of the albatrosses were exposed and even if none of the low-frequency energy in the boom were filtered by the bird's auditory system, the chances of auditory injury would still be considered small.

In humans and laboratory animals, sonic booms at this level are not known to produce significant temporary or permanent hearing damage (this includes experience conducted recently on pinnipeds [Stewart, 1998; Bowles et al., 1998]). This result is to be expected, as animal auditory systems are probably adapted to withstand exposure to occasional thunderclaps, which reach peak levels between 120 and 140 dB (unweighted SPL) and, like sonic booms, have a great deal of their energy at low frequencies. Experiments on both small mammals (reviewed in Bowles, 2000b, in prep) and pinnipeds suggest that the auditory system begins to experience changes in function at or above these levels. These include small, temporary changes in threshold, and alterations in the latency of the auditory brainstem response. In the absence of damage risk criteria designed specifically for animals, these changes suggest that levels exceeding the safe limit for humans (>140 dB peak weighted, corresponding to booms with peaks >~6 psf) should also be considered potentially hazardous to the hearing of a small proportion of animals. Much higher levels would be required to produce population-level effects. For birds, the risk is short-term, as birds regenerate damaged hair cells within a few months of intense noise exposure (Corwin and Cotanche, 1988; Saunders et al., 1991).

Because the sonic booms are short-term (<500 ms), and because they are relatively similar to thunderclaps, it is difficult to envision behavioral responses that would have biologically significant effects on albatrosses in the open ocean.

4.4.1.4.3 Cetaceans

The humpback whale and gray whale use the nearshore waters of Narrow Cape and Ugak Island. The whales are found in this area during only part of the year, with peak migratory periods occurring from April through May and November through December. Impacts from QRLV launches would not be significant (see discussion in Section 4.4.1.3.2 - Marine Mammals, Cetaceans).

4.4.1.4.4 Steller Sea Lions

It is estimated that approximately 300 to 400 Steller sea lions utilize Ugak Island as a haulout, but not a rookery, during the late summer and early fall postbreeding period (USAF, 1997). This period of time is outside the launch window of the proposed QRLV program, as launches would occur between February 1 and April 30. As a result, the proposed QRLV program would not impact the postbreeding period of these animals (see discussion in Section 4.4.1.3.2 - Marine Mammals, Pinnipeds, and results of *ait*-1 and *ait*-2 noise monitoring in Section 4.6.1 - Proposed Action).

4.4.1.5 Essential Fish Habitat

The sensitivity of Essential Fish Habitat (EFH) to human-induced environmental degradation and the extent to which human activities stress the habitat are the only considerations for fish and invertebrates close to the launch site. The area likely to be affected by any given QRLV launch is small. Potential impacts on managed species or EFH would result from failure of the vehicle, either because parts of the vehicle impact a sensitive area or because toxic unexpended solid propellant (in particular, ammonium perchlorate) is released into the water. The chance of such a failure is small, as is the area of potential impact. As discussed in the sections that follow, impacts of the QRLV Program are not expected to result in significant impacts to EFH. Further, in the unlikely event of a launch failure, impacts would be highly localized. As a result, the USAF is not required to engage in formal consultation with NMFS, pursuant to MSFCMA. Discussion of potential effects to air quality from vehicle launch or abort that could subsequently impact EFH is provided in Section 4.5.1.1 - Lower Atmosphere Emissions.

The waters south of Kodiak Island are particularly rich in fishery resources during the spring, summer and fall, and are essential habitat for commercially-important species all year round. First, as with high latitude waters in other areas, nutrient levels and standing stocks of prey species and phytoplankton are very high in the area during the summer months. Second, the continental shelf break lies close to the southern and southeastern coast of the island, with several deep canyons running even closer to the island (including one that terminates in Ugak Bay, approximately 6 miles west of KLC). Third, runoff from coastal rivers is high, introducing further nutrients into the water and permitting entrance points for anadromous fishes. The habitat off Narrow Cape is particularly important to a number of species during the late winter-

early spring period, all of which use bottom substrates and/or the water column from the edge of the narrow continental shelf up to the littoral zone. As shown in Table 3.4-1, these species include:

- Walleye pollock
- Flatfish (yellowfin sole, flathead sole, arrowtooth flounder)
- Rockfish (yelloweye rockfish, thorneyhead rockfish)
- Sculpins
- King crab (*Paralithoides* spp.)
- Tanner crab
- Dungeness crab
- Weathervane scallop

4.4.1.5.1 Nominal Launch

The potential threat to EFH and managed species during a nominal launch would be from spent stages, which could impact pelagic waters more than 400 kilometers (km) off the coasts of Washington and Vancouver Island. While this dropping of spent stages might affect individuals of any species likely to be found close to the surface, there is no chance that it could kill a large enough number of individuals to be significant, or even detectable, from a population perspective. Nearly all the propellant in the motors would have been expended long before impact, leaving only trace quantities on the spent stages, so the possibility of toxic effects would be negligible.

4.4.1.5.2 Launch Failure or In-Flight Failure

Although launch failure or in-flight failure is a possibility, it is not anticipated. Since the Space and Missile Systems Center, Test and Evaluation Directorate (SMC/TE) was restructured in 1995, the success rate for all launches has been 100 percent. The corresponding reliability (from a test set of 18/18 successful launches) has been calculated to be 95 percent. As a result, a launch failure related to the QRLV Program is unlikely. In the unlikely event of a failure, species that inhabit areas in the vicinity of KLC (inshore/offshore and marine/offshore) have the potential to be affected. Pelagic species and deep-water inhabitants are less likely to be affected, due to their distance from the launch site, the large volumes of well-mixed water around them, and the sinking of fuel away from the most productive surface and mid-level waters.

The principal concerns of failure are launch-site and in-flight malfunctions within the first 60 seconds of launch. A vehicle may malfunction on the launch pad or may deviate from its anticipated flight path after takeoff, requiring the flight to be terminated. Debris resulting from a launch-site malfunction can be scattered anywhere within the launch hazard area, which would

have been cleared of all nonessential individuals prior to the launch. Debris resulting from an in-flight malfunction would impact within the flight corridor footprint shown in Figure 4-1. Impacts would not be significant.

In response to ongoing interagency coordination, the Range Safety organization (NAWCWPNS) has agreed to comply with the desire of NMFS to minimize near-shore destruct actions to the extent feasible by allowing an anomalous vehicle to continue to fly within the predetermined destruct corridor (see Figure 4-1). However, due to prescribed safety constraints, if a vehicle crosses the predetermined destruct boundary, Range Safety must terminate it immediately, regardless of its position relative to the shore.

In the unlikely event of a launch failure or abort, potential impacts to EFH and managed species are most likely to occur within the first minute of launch, whereby unspent solid rock motor (SRM) propellant debris has the potential to fall into coastal waters near KLC. During a launch failure/abort, debris could be scattered in the region surrounding the launch site and in downrange areas over the ocean. The vehicle location, direction and speed, and wind conditions at the time of failure, are the major factors in determining the exact debris footprint from a failed launch. The potential on-ground and in-flight debris limit for a failed QRLV launch is shown in Figure 4-1.

Falling debris and unspent propellant from a QRLV vehicle from a failure close to the coast of Narrow Cape, i.e. at launch, could pose a risk to EFH. In this case, dropping debris might impact small sections of habitat, but again would not directly pose a detectable or significant population-level risk. Because most of the propellant is expended over land during the initial seconds after launch of the vehicle, the amount of propellant that falls into the water along the trajectory over outer or middle continental shelf waters would be inconsequential. Thereafter, the volume of propellant entering the water at any point would be vanishingly small, and propellant that did enter the water would be mixed rapidly with a large volume of ocean water.

Although the propellant would sink, unspent propellant dropping into shallow water or clinging to pieces of the vehicle, particularly in relatively enclosed coves or embayments, could pose a hazard. In these areas, concentrations of any toxins would be at their highest, due to relatively lower volumes and limited flow of ocean water. Also, toxins would have a greater chance of being encountered by feeding animals in shallow water than in deep water. The hazards posed by unspent propellant would be greatest for eggs and larvae, which have little protection from even small changes in their chemical environment.

The potentially toxic components of propellants planned for the QRLV launches are ammonium perchlorate, aluminum, polyurethane, carboxyl-terminated polybutadiene, cyclotetramethylene tetranitramine, hydroxyl-terminated polybutadiene, and nitrocellulose-nitroglycerine. Quantities of propellant are provided in Table 2-2. In the event of a launch failure, scattered pieces of solid propellant will continue to burn if they fell on dry land, potentially releasing substances such as Al_2O_3, carbon monoxide, hydrogen chloride and nitrous oxides.

Even if all of these substances proved to be highly toxic, the chances of significant discharge into shallow coastal waters is small. First, the chance of launch vehicle failure is small. Second, little of the propellant will be available for release by the time the vehicle moves out over water. Third, if the vehicle were to fail at any time after it crossed over the shoreline, it would be moving so rapidly that pieces would not strike the water for many kilometers downrange. Fourth, pieces of a size to be ingested would be widely scattered. The riskiest scenario would be a failure occurring after the vehicle had begun to rise, but had not yet achieved maximum velocity. In this case, pieces would be scattered widely, spreading unexpended propellant over land as well as the shoreline, thus moderating potential danger to EFH.

In the event of a launch failure and propellant entry into water, some components of the propellant would begin to break down quickly, while others would dissolve slowly. In the ocean, powdered aluminum would rapidly oxidize to aluminum oxide. The ammonium perchlorate is soluble, but dissolves slowly if deposited in large fragments. Leaching rates for large fragments range between 0.001 cm^2/s and 0.0034 cm^2/s in salt water (CH2M Hill, 2000). Therefore, even if propellant were released into water in substantial quantities, dilution would rapidly detoxify the slowly-leaching propellant.

Currently, little is known about the toxic action of these substances on marine fish or invertebrates. Responses of some species of marine algae to concentrations of ammonium perchlorate have been studied (Stauber, 1998). The median effective concentration (a measure comparable to L50) ranged between 0.5 and 11 mg/L. Dilution beyond this concentration would vary with current patterns. In the vicinity of the launch site, with its energetic wave action and tidal flux, dilution would occur within a few centimeters of the fragment except within Triple Lakes. Thus, only substrate, seagrasses and biota within the immediate vicinity of the fragment would be affected. Based on the combination of the above factors, the risk of a biologically-significant release of toxins into EFH close to shore is negligible.

4.4.1.6 Monitoring

Although significant impacts to species of concern in the Narrow Cape area are not anticipated, monitoring of launches from KLC shall continue. Monitoring will be conducted by ENRI in accordance with requirements of the Alaska Aerospace Development Corporation (AADC) Environmental Monitoring Plan (EMP). The EMP requires monitoring of at least the first five launches from KLC. The following monitoring tasks for biological resources are required under the EMP (ENRI, 2000):

- Steller sea lion surveys.
- Rocket motor noise measurements.
- Steller's eider surveys.
- Bald eagle nest monitoring (required only during the period of nest occupancy, from late April to September.
- Environmental quality (includes water chemistry, macroinvertebrates, in-stream sediment and vegetation).

In addition, USAF will monitor the QRLV launches according to ongoing coordination with National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS).

4.4.2 CUMULATIVE IMPACTS

The potential cumulative impact to biological resources from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. A cumulative impact would require multiple failures at a point in flight that would affect EFH or other sensitive biological resources. Such occurrence is not expected.

4.4.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts to biological resources from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

4.5 AIR RESOURCES

4.5.1 PROPOSED ACTION

4.5.1.1 Lower Atmosphere Emissions

The USAF suborbital QRLV vehicles will not require the use of Class I or Class II ozone-depleting substances (ODS) in the operation or maintenance of their subsystems, components or processes. Therefore, no ground-level ODS will be emitted as a result of QRLV processing at KLC. Since prelaunch processing of the QRLV launch vehicles will be minimal, ground-level activities involving substances other than ODS also are not expected to impact air quality.

Within the lower atmospheric region, ground-level emissions from launch are the primary consideration. Computer model calculations were performed to estimate emissions from both normal launches and ground-level catastrophic aborts at KLC for the *ait* EA (USAF, 1997).

For the *ait* EA, two meteorological cases were analyzed, one each for the months of March and June, to correspond to the proposed launches of the USAF *ait* test vehicles from KLC. Because the proposed action is for one launch per year from February 1 through April 30, the month of March provides representative data and will be described herein. The *ait*-1 vehicle used as the basis of the emissions calculations (USAF, 1997) is the same as the proposed QRLV-3 vehicle, the second largest of the four QRLV configurations. The QRLV-4 first stage contains 61 percent more propellant than the QRLV-3 first stage. However, due to differences in combustion temperatures, prevailing winds and other factors, downwind concentrations of pollutants will not necessarily increase by that amount. Therefore, the emissions calculations provided are representative of the QRLV launches.

On Kodiak, wind direction is independent of time of year; the main seasonal variations are temperature and wind speed. For the USAF *ait* analysis, the Rocket Exhaust and Effluent Disperson Model (REEDM) was used. The average wind speeds used in the analysis for the month of March were 5.55 meters per second (m/s). These values are close to the yearly average of 4.9 m/s from a prevailing northwest direction. (The calculations would not change significantly if a different launch month were selected.) The dispersion model is not highly sensitive to temperature, but a typical temperature of 0.5 degrees C for March was used for the analysis. The wind conditions most likely to produce adverse air quality impacts, nearly calm winds out of the west, also were analyzed. These conditions occur 2 percent of the time throughout the year. No meteorological constraints on launching due to vehicle emissions were identified for the USAF *ait* flights from KLC (USAF, 1997).

Pollutant concentrations versus distance downwind were calculated for a normal USAF *ait* launch and for an aborted launch for both typical and calm wind conditions. For a normal launch, five pollutants are predicted; aluminum oxide (Al_2O_3), hydrogen chloride (HCl), carbon monoxide (CO), nitric oxide (NO) and molecular chlorine (Cl_2). For the abort case, only three pollutants are tracked since the model does not predict the formation of NO or Cl_2. Because KLC is near the ocean, a significant fraction of the gas phase HCl will condense in the marine aerosol. This will lower the gas-phase concentrations near the launch site (USAF, 1997).

For normal launches, the two wind/month conditions result in similar maximum concentrations of the five pollutants. The peak concentrations for gas phase pollutants are less than 0.5 parts per million (ppm) for locations downwind; none but HCl exceeds 0.05 ppm. As the wind speed increases, the peak is reduced and occurs a greater distance from the launch site (USAF, 1997).

For launch abort cases, downwind concentrations of the three pollutants are expected to be lower than for normal launches. This is because solid propellant burns more slowly in the open than in a rocket motor, and because the explosion is expected to scatter chunks of solid propellant over a wide area. However, the downwind range of peak concentrations would be greater for the abort cases, consistent with the scattering of solid-rocket propellant in an explosion. Peak concentrations are not affected by season (USAF, 1997).

The 1-hour average exposure for a person coincidentally situated at the location of peak concentration downwind from a QRLV launch would be less than 0.025 ppm for the conditions analyzed. The Occupational Safety and Health Administration (OSHA) personal exposure limit for HCl is 5 ppm on an 8-hour basis. The USAF Space Command Surgeon's Office recommends an instantaneous maximum HCl exposure of no greater than 10 ppm to sensitive human populations on or near Vandenberg Air Force Base and Cape Canaveral Air Station. That level of exposure would pose some risk to the average individual, but it would not cause permanent health effects. For exposures above 10 ppm, persons should seek shelter or remove themselves from the area. Discomfort also may be felt at a 2 ppm 1-hour average, or at instantaneous exposure of 10 ppm, but no hazard to healthy individuals occurs at that level. The HCl 60-minute mean concentrations of 0.025 ppm predicted from the QRLV launches fall far below these levels. These exposure levels are provided for information purposes only. Since the occurrence of the ground cloud from a QRLV launch is transient and moves with the prevailing winds, 60-minute exposures do not occur. Further, because of launch safety procedures, no persons are allowed in the Safety Exclusion Zone or downwind where the ground cloud will occur.

The concentrations of Al_2O_3 downwind from a QRLV launch or abort are expected to be less than 2 milligrams per cubic meter (mg/m^3), while 60-minute maximum exposures would be less than 0.25 mg/m^3. The USAF has not established exposure standards for alumina particles. However, the concentrations of Al_2O_3 may be used for cumulative air quality considerations of particulate matter (aerodiameter less than 10 microns [PM_{10}]).

Because the FAA EA indicated that the highest concentrations of launch emissions were found on an uninhabited mountain 5 km east of the launch site, the USAF evaluated the same location. In the prevailing wind cases, concentrations at the mountain site are zero except for Al_2O_3. For the calm wind cases, the Al_2O_3 concentration is approximately 30 percent smaller than the peak concentrations; the other chemical species are a factor of 5 to 10 smaller than their respective peak concentrations.

The difference between the results presented in the FAA EA and those in the *ait* EA are due to the fact that the mountain site is located inland from the launch pad. Many of the peak concentrations, especially in the prevailing wind cases, will occur over the open ocean.

In conclusion, HCl is the main gas phase pollutant released during the USAF *ait* launches, with peak concentrations below 0.5 ppm, and 60-minute mean concentrations below 0.025 ppm. The peak levels are expected to occur at unpopulated locations downwind of the launch site. In addition, these levels would not be harmful to individuals should exposure occur. As addressed in the *ait* EA, these levels would not result in significant impacts to plants or animals from the USAF *ait* launches, and other gas phase pollutant concentrations will be an order of magnitude smaller. These results also are applicable to the QRLV Program. Discussion of potential impacts to terrestrial, aquatic and marine biota (including sensitive species) is provided in Section 4.4.1 - Proposed Action.

4.5.1.2 Upper Atmosphere Emissions

The first and second stage solid rocket motors of the USAF *ait* (and QRLV) vehicles produce exhaust emissions containing chlorine compounds. The primary chlorine compound produced at the nozzles of each of the two stages is HCl. Through high temperature afterburning reactions in the exhaust plume, the HCl is partially converted to atomic chlorine (Cl) and Cl_2 (USAF, 1997). These more active forms of chlorine can contribute to localized ozone depletion in the wake of

the launch vehicle and to the overall global chlorine loading which contributes to long-term ozone depletion. The HCl remains in the stratosphere for about 3 years and then diffuses down to the troposphere (USAF, 1997).

The *ait*-1 vehicle emissions analysis is presented here as a representative case for the QRLV Program because the *ait*-1 vehicle was the same as the QRLV-3 configuration, the second-largest of the four QRLV configurations. The first QRLV launch proposed for March 2001 will use a single-stage vehicle. However, the two-stage QRLV-3 and QRLV-4 may be used in future years.

Like the *ait*-1 vehicle, QRLV-3 will spend approximately 25 seconds in the stratosphere between 15 and 40 km. The first stage of the vehicle will deposit approximately 400 pounds (lbs) of HCl and approximately 550 lbs of combined Cl and Cl_2 between 15 km and 34.6 km (burn-out). This represents less than 30 lbs of active chlorine being distributed per km of altitude by the first stage. The second stage, which ignites at an altitude of 34.6 km, will contribute a total of approximately 6 lbs of HCl, Cl and Cl_2 between ignition and 40 km altitude. It is estimated that less than 1 lb per km of altitude of the active forms of chlorine would be emitted by the second stage. Due to the large air volume over which these emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from the USAF *ait* (or QRLV) vehicle launches would not contribute to localized ozone depletion. Since the proposed QRLV launches are spaced one year apart, there is no local cumulative effect in the stratosphere from chlorine compounds generated by the launches. On a global scale, approximately 956 lbs of chlorine will be added to the stratosphere from each launch of a QRLV-3. This amount is a very small fraction of chlorine compared to other solid rockets in use.

Two other types of substances, Al_2O_3, and nitrogen oxide (NO_x) species, also are of concern with respect to stratospheric ozone depletion. The Al_2O_3, which is emitted as solid particles, has been the subject of study with respect to ozone depletion via reactions on solid surfaces. The studies indicate that Al_2O_3 can activate chlorine (USAF, 1997). The exact magnitude of ozone depletion that can result from a buildup of Al_2O_3 over time has not yet been determined quantitatively, but will be insignificant based on existing analyses.

Exhaust from the first stage of the USAF *ait* vehicles is approximately 27 percent by weight Al_2O_3, with second stage exhaust 35.4 percent Al_2O_3 by weight. The total amount of Al_2O_3 deposited between 15 and 40 km by each 2-stage *ait*-1 (or QRLV-3) flight is approximately 1,180 lbs from the first stage and 83 lbs from the second stage. The Al_2O_3 is in the form of smooth particles, with sizes varying in diameter from less than 1 micron to 10 microns

(USAF, 1997). Depending on the altitude of injection, the particles diffuse out of the stratosphere in time periods varying from weeks to a few years. The particles will participate in reactions that may cause ozone depletion during the limited time they stay in the stratosphere (USAF, 1997). The Al_2O_3 particles would add to the overall atmospheric burden of particles until they eventually migrate downward to the ground. However, due to the large volume of the stratosphere and the rapid horizontal mixing that occurs, these particles would not cause significant localized effects on stratospheric ozone. On a regional or global scale, the chlorine and alumina will add to the total chemicals in the stratosphere, but the amount is so small that it is difficult to assign statistical significance to their effects on the ozone layer.

Nitrogen oxide, like certain chlorine-containing compounds, contributes to catalytic gas phase ozone depletion. The production of NO_x species from solid rocket motors is dominated by high-temperature reactions known as "afterburning" in the exhaust plume. As the temperature of the exhaust decreases with increasing altitude, less NO_x is formed. For *ait* (and QRLV-3 and QRLV-4), the first-stage afterburning production of NO_x is nearly shut down before the vehicle reaches the stratosphere. The total NO_x deposited in the stratosphere is approximately 4 lbs from the first stage and less than 1 lb from the second stage (*ait*-1 and QRLV-3). Because diffusion and winds would disperse these quantities rapidly, no significant effect on ozone levels is expected from these emissions.

In summary, HCl, Al_2O_3 and NO_x emissions into the stratosphere from QRLV launches would be insignificant because of the rapid dispersion predicted for such small quantities of substances. The small quantity of these compounds from the USAF QRLV Program would not have a significant impact on stratospheric ozone.

4.5.2 CUMULATIVE IMPACTS

Due to the wind dispersion at Narrow Cape and the eventual gravitational settling of Al_2O_3, there would not be significant cumulative impacts to air resources associated with the QRLV Program. Cumulative impacts to the upper atmosphere would be minimal compared to impacts caused by other launch vehicles. The expected emissions from worldwide space launches annually during the years 1998 to 2010 is 2,161 tons of alumina particles and 1,468 tons of inorganic chlorine (USAF, 1997). Since some of the QRLV launches will emit less than QRLV-3, and some may emit more, the QRLV-3 was used as a representative baseline model. In such a case, using calculated emissions for the QRLV-3 configuration, a QRLV-3 launch would release an estimated total of 2,219 lbs of $A1_2O_3$ (approximately 956 lbs of inorganic chlorine and

1,263 lbs of $A1_2O_3$). In a recent global model based on nine Shuttle missions and three Titan IV missions, Jackman (1998) found a steady-state annual-averaged total global ozone loss of 0.033 percent. The total amount of deposition from those launches was estimated to be 1,941 tons of HC1 and $A1_2O_3$ per year. Since the annual global ozone depletion was estimated to be 1.5×10^{-5} percent per ton released, approximately 1.1 tons from each QRLV-3 launch would indicate an average annual global ozone loss of approximately 1.8×10^{-5} percent. (These numbers are provided only as order of magnitude estimates, since they are based on extrapolation from a detailed global model.)

The potential cumulative impact to air resources from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year also would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.5.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts to air resources from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

4.6 NOISE

4.6.1 PROPOSED ACTION

The USAF conducted noise monitoring of the launch of *ait*-1 on November 5, 1998, and of *ait*-2 on September 15, 1999. The results of the *ait*-1 and *ait*-2 monitoring are shown in Table 4-2. Results are reported as A-weighted sound exposure levels (ASEL) and peak unweighted sound pressure level (SPL). The A-weighting represents a filter to include frequencies that elicit responses or cause effects in hearing on humans. Essentially, it is a noise filter that de-emphasizes frequencies below 100 Hz and above 8 kHz, which humans hear poorly. A-weighting is frequently used even for animals because it is a recognized standard and because it eliminates low frequencies that many mammals cannot hear (Bowles, 2000a). The sound exposure level (SEL) sums the total sound energy over the duration of a noise event. It can be a more meaningful measure of noise impact than the maximum sound level alone, as it accounts for the duration of the noise being measured (USAF, 1997).

For the *ait*-1 launch, noise was measured from three locations: near the two lagoons on the eastern shore of Kodiak Island (azimuth site), on the ocean bluff at the southern KLC boundary (Narrow Cape), and just above the beach at the northern spit at Ugak Island. Most of the sound energy that impacted the azimuth site occurred within 20 seconds after launch, with some noise audible for about 1 minute. The ASELs were 100 dB at the azimuth site (Site 1), 113.4 dB at the Narrow Cape site (Site 2), and 88.4 dB at the Ugak Island site (Site 3) (Stewart, 1999).

The *ait*-2 launch of September 15, 1999, also was monitored. The ASEL measured at the Ugak Island monitoring site was 92.2 dBA, 7.1 dB higher than observed during the *ait*-1 launch.

TABLE 4-2

NOISE FROM *ait*-1 AND *ait*-2 LAUNCH EVENTS

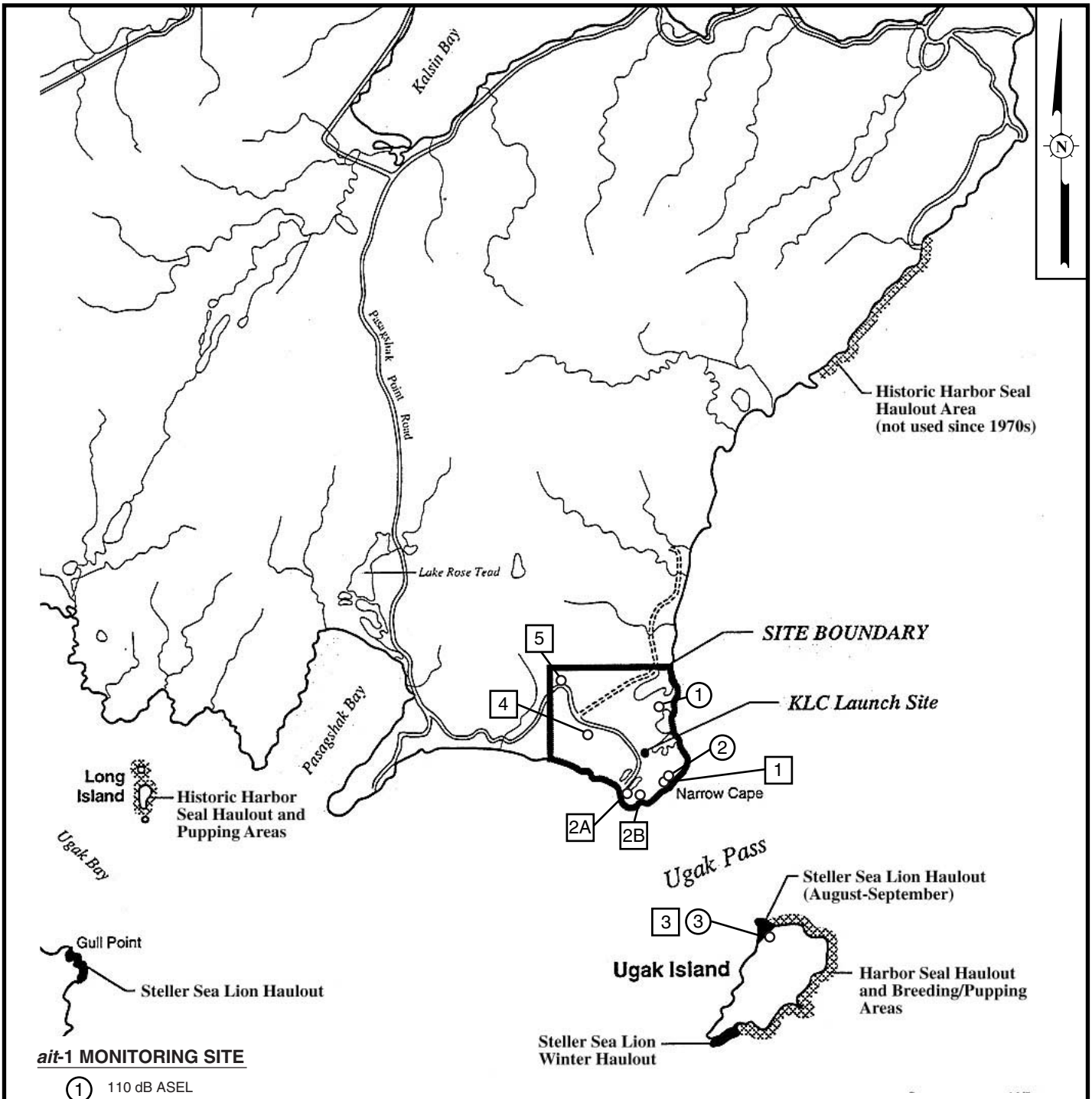
LAUNCH	MONITORING SITE[1]		A-WEIGHTED SOUND EXPOSURE LEVELS (ASEL) (dB)	PEAK UNWEIGHTED SPL (dB)
ait-1	1	Azimuth Site	110.0	--
ait-1	2	Narrow Cape	113.4	--
ait-1	3	Ugak Island	88.4	--
ait-2	1	Narrow Cape (under launch trajectory)	109.8	124.6
ait-2	2a	Narrow Cape (WWII bunkers)	109.4	123.2
ait-2	2b	Narrow Cape (WWII bunkers, ENRI site)	110.7	125.5
ait-2	3	Ugak Island	92.2	107.1
ait-2	4	Payload Processing Center	109.7	127.1
ait-2	5	Launch Control Complex	107.9	127.5

[1] Locations shown in Figure 4-3.

Source: Stewart, 1999 (*ait*-1); Bowles, 2000a (*ait*-2).

The results of the two monitoring events are applicable to the proposed action, as the *ait*-1 and *ait*-2 vehicles are the same as QRLV-3 and QRLV-4, the two largest launch vehicles that would be utilized for the proposed action. The other two vehicles, QRLV-1 and QRLV-2, are smaller than the *ait* vehicles previously launched from KLC.

The KLC Environmental Monitoring Plan (EMP) is a condition of the KLC site license and includes the requirement for noise monitoring of at least the first five launches from KLC. Monitoring will be conducted by the University of Alaska, Anchorage, Environment and Natural Resources Institute (ENRI) in compliance with the EMP. In addition, USAF will continue to



***ait*-1 MONITORING SITE**

1	110 dB ASEL
2	113.4 dB ASEL
3	88.4 dB ASEL

***ait*-2 MONITORING SITE**

1	109.8 dB ASEL
2A	109.4 dB ASEL
2B	110.7 dB ASEL
3	92.2 dB ASEL
4	109.7 dB ASEL
5	107.9 dB ASEL

ASEL = A-WEIGHTED SOUND EXPOSURE LEVELS

0 2 4 Miles

SCALE

See Table 4-2 Source: Stewart, 1999; Bowles, 2000a; ENRI, 2000.

MEASURED LAUNCH AND IN-FLIGHT NOISE LEVELS (ASEL) *ait*-1 AND *ait*-2

U.S. AIR FORCE
QUICK REACTION LAUNCH VEHICLE PROGRAM

FIGURE 4-3

coordinate with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) regarding whether future monitoring is required.

Based on data collected by USAF during the launches of *ait*-1 and *ait*-2, it appears that noise levels at Ugak Island have a large low-frequency component that sea lions may be unable to hear (Bowles, 2000a). A-weighting filtering includes such low frequencies and, as a result, may be a poor predictor of sea lion responses. Until the best predictors for sea lions have been determined, monitoring techniques utilized by the USAF for QRLV launches would include the collection of broadband information in addition to other measures deemed useful. This would involve collecting either broadband or one-third octave-band recordings.

4.6.2 CUMULATIVE IMPACTS

The potential cumulative impact to noise from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.6.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While noise impacts from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative. While the noise levels and sonic boom overpressures from the USAF QRLV program would not be significant, these impacts would not occur under the No Action Alternative.

4.7 LAND USE AND RECREATION

4.7.1 PROPOSED ACTION

The QRLV Program would occur at KLC, which has been permitted and developed specifically for the purpose of launching orbital and suborbital rockets. As a result, the Proposed Action, which involves launching one suborbital rocket per year for a period of eight years, would be consistent with the existing, permitted land use.

During pre-launch and launch activities, recreational uses of KLC and the surrounding Narrow Cape area would be intermittently affected, including Fossil Beach, Twin Lakes and Narrow Cape. There would be temporary closure of Pasagshak Point Road at the KLC boundary during payload transfers to the launch area, and full-day closure on the day of launch. Noise from each launch would be loud, but would be audible for a limited amount of time (about 1 minute) and would not be expected to interfere with the area's fishing, camping or other recreational uses. Also, to ensure the safety of fishermen, fishing would be restricted in the area of the flight path on the day of launch.

The Kodiak National Wildlife Refuge is not expected to be affected because of its distance of approximately 30 miles from KLC, because roads to KLC do not pass near the refuge, and because the launch vehicles would not pass over the refuge. Impacts of the QRLV Program to the area's recreational resources and opportunities would not be significant.

4.7.2 CUMULATIVE IMPACTS

The potential cumulative impact to land use and recreation from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.7.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts to land use and recreation from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

4.8 SOCIOECONOMICS

4.8.1 PROPOSED ACTION

It is anticipated that the USAF would transport an estimated 40 personnel to Kodiak Island to work at KLC approximately six weeks prior to launch, with a gradual increase to 60 personnel. In addition, one or two workers from local construction trades may be required. The island is accustomed to frequent fluctuations in population as a result of its tourism and fishing industries,

and expenditures from this additional population would be considered beneficial. As a result, population changes related to one QRLV launch per year would not result in significant impacts.

To ensure the safety of fishermen and other sea traffic operating off the coast of Kodiak Island during QRLV launches from KLC, preparatory to launches, a safety area will be established, within which risk to the public would exceed one in one million if sea traffic were present during a launch (FAA, 1996). This area will be cleared prior to launch. At completion of launch activities, sea traffic will be allowed to re-enter the area. This clearance will be temporary, occurring only on the day of the launch. As a result, impacts to commercial fishing and other boating activities would be minimal.

The Kodiak community hosts a Whale Fest each April during the gray whale migration, and the Narrow Cape area is a prime whale viewing area during the spring migration. In preparation for a QRLV launch, the shoreline of Kodiak Island in the vicinity of KLC is planned to be closed to the public on the day of launch. It will be open the day before and the day following each launch. Although launch delays could result in additional closures of the KLC area, effects to the annual Whale Fest are expected to be minimal.

Physical impacts to traditional communities would be less than to Kodiak City, which is closer to KLC (23 miles) than is the nearest traditional village, Ouzinkie, approximately 33 miles from KLC. There have been no identified adverse economic impacts to minority or low income communities. As a result, impacts to minority communities or communities of low income are neither adverse nor disproportionate compared to the larger community.

4.8.2 CUMULATIVE IMPACTS

The potential cumulative impact to the socioeconomic environment of Kodiak Island from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.8.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. Also, socioeconomic impacts from the USAF QRLV Program would not occur under the No Action Alternative.

4.9 VISUAL RESOURCES

4.9.1 PROPOSED PROJECT

Impacts to visual resources are a matter of aesthetics and are influenced by size, dissimilarity to surroundings, and quantity and frequency of viewers. Visual impacts of the QRLV Program would include human activity at KLC, which could be visible to persons utilizing the area for recreational purposes. Such activity is consistent with the permitted use of KLC and would not be significant. The primary visual impact would be the white ground cloud and launch plume immediately after launch. Visibility would depend on the location of the viewer relative to the launch stool and vehicle flight path.

At the time of launch, members of the public would be outside the safety exclusion zone and at least 2 miles from the launch stool, with views restricted by distance and/or intervening topography. The launch plume would extend several hundred feet from the ground, but would dissipate in a matter of seconds or minutes, in response to wind conditions. As a result, the number of people who could see the launch vehicle and plume would be limited. Further, based on the direction and speed of the launch vehicle, and plume dissipation, potential visibility would be a matter of seconds or minutes. Based on the above, and the occurrence of one launch per year, visual impacts of the QRLV Program would not be significant.

4.9.2 CUMULATIVE IMPACTS

Because the launches are short-duration events with plumes that rapidly dissipate, the cumulative impact to the visual resources from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.9.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While visual impacts from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

4.10 CULTURAL RESOURCES

4.10.1 PROPOSED ACTION

Potential impacts of the QRLV Program are related subsistence harvesting and to archaeological and historic resources. Impacts to subsistence harvesting could occur from effects to subsistence resources or prevention of access to harvest areas. Potential impacts to biological resources are addressed in Section 4.4 - Biological Resources. Public access to harvest areas at and in the vicinity of KLC would be prohibited on the day of launch (one day per year). Because the KLC area is limited in use as a subsistence harvest area, closure for one day per year would not be significant.

No disproportionate impacts on Native Americans, low income or minority populations are expected, due to the fact that the Narrow Cape area does not appear to be a high use area for subsistence harvesting, and the large harvesting areas available nearby along the coast.

There are two archaeological sites and a complex of world War II-era bunkers on Narrow Cape in the vicinity of KLC. The increase in human activity related to the proposed QRLV Program could increase the likelihood of impacts to these resources. However, only authorized persons would be involved in launch-related activities, and KLC security personnel would be on the site. As a result, impacts to these resources are not anticipated.

4.10.2 CUMULATIVE IMPACTS

Based on the potential cumulative six launches in 2001 (USAF-1; NASA-1, U.S. Army-4), followed by five launches per year for 5 years (USAF-1; U.S. Army-4), access to subsistence harvest areas at KLC and in the vicinity could be closed six days in 2001 and five days per year during the USAF/U.S. Army programs, and one day per year for the remainder of the QRLV Program. However, the Narrow Cape area hosts limited subsistence harvesting activities, while the larger area of the coast from Pasagshak Bay to the far southern end of Kodiak Island is a

harvesting area. As a result, the temporary access restrictions to KLC and the Twin Lakes area for the approximately five or six cumulative launches in one year would not be significant given the larger range that would not be closed.

Cumulative impacts to archaeological and historical resources also are not expected. Only authorized personnel would be involved in onsite activities, and KLC security personnel would be active in the area.

4.10.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. There would be no potential for impacts to cultural resources from the USAF QRLV Program.

4.11 HEALTH AND SAFETY

4.11.1 PROPOSED ACTION

The U.S. Air Force (USAF) has conducted an analysis of the representative trajectory of the Quick Reaction Launch Vehicle (QRLV) launch vehicles to determine the area for range surveillance, clearance and air traffic control. The trajectory also provides a basis for establishing the ground hazard area and areas over the ocean where debris from an early flight termination may fall, although early termination is not anticipated. Failure of a missile guidance system that would cause debris to fall outside the ground and launch hazard areas would be detected by the range safety officer, who would terminate the missile flight before it could cross the hazard area.

The trajectory of each QRLV flight would provide the basis for the Naval Air Warfare Center Weapons Division (NAWCWPNS), which would be responsible for range safety, to provide range clearance and surveillance for three designated areas of potential impact:

- Ground Hazard Area - Prior to launch, personnel not designated as "essential" would be evacuated from the ground hazard area (also called the Safety Exclusion Zone) (see Figure 4-1).
- Flight Hazard Area- There would be every practical effort to keep this area clear of nonparticipating aircraft and ships by establishing warning and restricted areas, publishing notices to airmen and mariners, and by maintaining close liaison and coordination with agencies controlling both air and surface traffic (see Figure 4-1).

- USAF QRLV Suborbital Vehicle Impact Area- Intended impact areas and the applicable airspace above would be surveyed, as necessary, to assure that ships or aircraft were not in the vicinity at the proposed time of impact.

During suborbital rocket flight operations, the potential impact zone includes the launch pad and surrounding area, and all locations along the flight corridor. The impact zone for public safety includes those areas within and adjacent to the site within a 10,000-foot radius of the launch stool. The public would be excluded well outside the potential impact zone (safety exclusion zone), shown in Figure 4-1.

The principal concerns are launch-site and in-flight malfunctions. A launch vehicle may malfunction on the launch pad or may deviate from its anticipated flight path after takeoff, requiring the flight to be terminated. Debris resulting from a launch-site malfunction can result in the scattering of missile debris anywhere within the launch hazard area (safety exclusion zone), which would have been cleared of nonessential individuals prior to the launch. Debris resulting from an in-flight malfunction would impact along the flight corridor footprint shown in Figure 4-1. Impacts would not be significant.

Each USAF QRLV vehicle would have an in-flight termination system capable of terminating thrust and/or aerodynamic lift, or destroying the missile, throughout the entire powered portion of the flight. The NAWCWPNS initiates flight termination action when:

- Data indicate that the missile impact point will violate impact limit lines and impact outside the designated protected impact area.
- Position of the missile is unknown due to the loss of tracking data.
- Vehicle has the potential to violate range safety impact limit lines.
- Missile performance diminishes such that continuation of flight creates a safety hazard and loss of range safety control.

This flight termination system provides a mechanism so that impact limit lines would not be violated in the event of a malfunction during flight. Therefore, potential impacts would not be significant.

4.11.2 CUMULATIVE IMPACTS

The one USAF QRLV launch, one NASA launch and four U.S. Army launches per year require thorough health and safety planning at the earliest stages, and health and safety requirements

would be implemented during all phases of operation. As a result, potential health and safety impacts have a very low probability of occurring. Cumulative impacts from these launches would not be significant.

Each of the launches would require evacuation of the Kodiak Launch Complex (KLC) area and closure of access roads, assuring that the public would not be exposed to potential health or safety hazards. As a result, no cumulative impacts to public health and safety are expected to occur.

4.11.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts to health and safety from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

4.12 HAZARDOUS MATERIALS AND WASTE

4.12.1 PROPOSED ACTION

The handling and use of hazardous and toxic materials at the launch site related to pre-launch, launch and post-launch activities would be limited. The use and disposal of hazardous materials and wastes would be in accordance with Kodiak Launch Complex (KLC) and U.S. Air Force (USAF) policies and procedures.

The USAF would remove hazardous and nonhazardous wastes for appropriate offsite disposal, in accordance with Alaska and Federal requirements. Nonhazardous waste would be removed for disposal at the Kodiak Island Borough landfill or on the Alaska mainland. The only hazardous materials would be oily rags, which would be removed from the processing area in sealed drums for disposal at an appropriate Class I or Class II facility or for recycling in accordance with USAF and federal regulations.

The potentially hazardous substances associated with the USAF Quick Reaction Launch Vehicle (QRLV) Program are contained within the various subassemblies and motors of the launch vehicle. Therefore, under nominal operating conditions, no hazardous materials are released before launch.

The QRLV propellants are suspended in a binder matrix within the solid rocket motors. The hydraulic fluid is enclosed in the vector control system and nozzle control system. Therefore, under nominal conditions, hazardous materials related to the QRLV vehicles are not released and do not present a potential impact.

Potentially hazardous substances such as HCl, Al_2O_3, and CO and NO would be generated from combustion of the solid rocket propellant during launch or in the event of a launch failure or abort. For a nominal launch, propellant would burn to completion. Small amounts of residual propellants in QRLV vehicles are expected to survive splashdown. Residual propellant would be less than a few pounds, consisting of powder on the inside of the motor casing, and would not result in significant impacts to the marine environment in the splashdown area.

In the event of an on-pad or in-flight launch failure, solid propellant is expected to be scattered over a wide area. If scattered on the ground, pollutant concentrations downwind are expected to be less than with a normal launch, as the solid propellant would burn more slowly in the open air than in a rocket motor. If debris is scattered over the ocean, impacts would be highly localized in the vicinity of solid rocket motor (SRM) propellant fragments on the ocean floor. The greatest potential impact would be from the leaking of ammonium perchlorate in the immediate area of any unspent propellant. However, due to the rapid dispersion of the small quantities of materials relative to the volume of the ocean, impacts would not be significant.

4.12.2 CUMULATIVE IMPACTS

The cumulative impacts to hazardous materials and waste from one QRLV launch per year, one NASA launch in 2001, plus four U.S. Army launches per year would not be significant. These impacts would be less than impacts from the nine launches per year analyzed for the FAA EA, which were determined to not be significant.

4.12.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. While impacts related to hazardous materials and waste from the USAF QRLV Program would not be significant, these impacts would not occur under the No Action Alternative.

5.0 MITIGATION MEASURES

No significant impacts are expected to result from implementation of the proposed action. As a result, no mitigation measures are identified at this time. Interagency coordination is ongoing with NMFS and USFWS. If other requirements are identified as a result of this coordination, by USAF monitoring or by results of the AADC Environmental Monitoring Plan, they will be implemented in accordance with applicable regulations.

Other measures described in the environmental resource sections of this EA include administrative or management controls and engineered systems required by USAF and/or environmental regulations. These measures are implemented through operating procedures.

6.0 AGENCIES AND INDIVIDUALS CONSULTED

The following individuals and agencies were consulted or provided information during preparation of this EA:

- Agencies
  - Federal Aviation Administration
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  - National Marine Fisheries Service
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APPENDIX A

INTERAGENCY COORDINATION

U.S. Department
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**Federal Aviation
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800 Independence Ave., S.W.
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September 20, 2000

Mr. Thomas Huynh
SMC/AXFV
2420 Vela Way Suite 1467
Los Angeles Air Force Base
El Segundo, CA 90245-4659

Dear Mr. Huynh:

Thank you for taking the time to discuss the upcoming Quick Reaction Launch Vehicle (QRLV) Environmental Assessment with me. The FAA is requesting to be a cooperating agency for this proposed action. Please feel free to contact me if you have questions or if you would like to discuss this further.

I look forward to working with you in the future on the Quick Reaction Launch Vehicle Environmental Assessment.

Sincerely,

for G. Nikos Himaras
Manager, Environmental Program

Cc: Michon Washington

Date: September 29, 2000

MEMORANDUM

To: Files

From: Robert Mason - TRC

Project: 00-194

Subject: Interagency Coordination: National Marine Fisheries Service (NMFS) – Quick Reaction Launch Vehicle Program, Kodiak, Alaska

On September 28, 2000, the U.S. Air Force, Space and Missile Systems Center sponsored an interagency coordination conference call regarding the Quick Reaction Launch Vehicle Program (QRLV) at the Kodiak Launch Complex (KLC), Kodiak, Alaska as it relates to marine mammals in the area. Key participants in the conference call included:

- Brad Smith – National Marine Fisheries Service
- Lt. Michael Watt – U.S. Air Force – SMC/TEB
- Tom Huynh – U.S. Air Force – SMC/AXFV
- Valerie Lang – Aerospace Corporation
- Nick Himaras – Federal Aviation Administration (FAA)
- Ann Bowles – Hubbs-Sea World
- Robert Mason – TRC

The purpose of the conference call was for the U.S. Air Force to provide an overview of the QRLV Program to Brad Smith of NMFS so that he could provide input on matters related to marine mammals in the area. The QRLV suborbital launch vehicle was described. Also discussed was that there will be a total of eight QRLV launches from KLC consisting of one launch per year beginning in March 2001, and that the QRLV launches would occur only during the months of February through April. This launch window is based on one of the objectives of the QRLV Program to support military exercises that occur annually during the February through April time period.

The group discussed noise levels anticipated from the launch of the QRLV and its similarity to noise levels from two previous U.S. Air Force suborbital launches from KLC using similar launch vehicles. Noise monitoring for these two previous launches was conducted by the U.S. Air Force in conjunction with NMFS.

Mr. Smith had several clarification questions regarding the QRLV Program and possible other launches from KLC by the U.S. Army. U.S. Air Force representatives on the conference call provided responses to Mr. Smith's questions and indicated that the Environmental Assessment being prepared for the QRLV Program will include an analysis of potential cumulative impacts.

Mr. Smith requested that the Environmental Assessment include a discussion of various marine mammals that could be present in the area of KLC during the February through April time period. Ann Bowles of Hubbs-Sea World indicated that the Environmental Assessment would include the discussion requested.

A interagency coordination meeting between the U.S. Air Force, NMFS, the U.S. Fish and Wildlife Service, Hubbs- Sea World and the FAA has been scheduled for October 24, 2000 in Anchorage, Alaska to continue coordination on the QRLV Program.

RCM/JB:rm

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

October 30, 2000

Pat Ladner
Alaska Aerospace Development Corporation
4300 B Street
Suite 101
Anchorage, Alaska 99503

Dear Mr. Ladner:

National Marine Fisheries Service has been coordinating with the Alaska Aerospace Development Corporation (AADC), the University of Alaska's Environmental and Natural Resources Institute(ENRI), and the U.S. Air Force (USAF) regarding monitoring of launches from the Kodiak Launch Facility(KLF). A primary concern of our agency has been the proximity of the Ugak Island Steller sea lion haul out to the KLF, and the impacts of launches on this endangered species. We have advocated behavioral monitoring of these animals during launches, coupled with acoustic monitoring to describe the received sound levels associated with any changes in sea lion behavior. In responding to the original proposal by AADC, our agency had recommended monitoring for the first 5 launches, with assurances that at least one launch using the Castor 120 motor would be monitored (this is the loudest motor anticipated to be used from the KLH). NMFS believes this monitoring is necessary to determine the impact of the KLH. If launches result in significant changes to the behavior of these animals, this take should be authorized through a small take authorization under the Marine Mammal Protection Act and through necessary permits under the Endangered Species Act.

Monitoring of the first two launches from the KLF has not produced definitive results regarding the effect of launches on the sea lions at Ugak Island. Further, as the haul out is seasonally occupied by these animals, some launches may occur when no sea lions are present. Therefore the requirement to monitor the first five launches is somewhat meaningless unless it is clarified to refer only to launches at times when the site is occupied by sea lions. We now believe it is prudent to monitor these launches until the necessary information is obtained, regardless of the number of launches. This will insure that sea lions, and other marine mammals present in the launch area, will not be "taken" in violation of the Marine Mammal Protection Act

or Endangered Species Act. These observations will also facilitate decisions concerning small take authorizations.

The ENRI, and contractors to the USAF, have provided very useful acoustic data gathered during the first two launches. We recommend these efforts continue for future launches, with some modification. Launches should be recorded from Ugak Island using an un-weighted continuous recording over the duration of the launch event. Reporting of the sound exposure levels may be presented using hearing sensitivities (thresholds) for sea lions and as peak levels. Average sound levels (un-weighted) over the duration of the launch may also be descriptive for these purposes. The monitoring report of the AIT-2 launch prepared by Hubbs-Sea World Institute was particularly thorough in presenting these data. A-weighting is not considered appropriate for these observations, and NMFS encourages future monitoring to gather un-weighted acoustic data.

Remote video recording of the seal lions during launches is essential to this issue, and should continue. Additionally, we feel their may be merit in attempting to position a human observer on Narrow Cape or Ugak Island during upcoming launches to directly observe reactions. We expect to coordinate with AADC and the various KLF users on monitoring issues during the planning process for these launches. To date, AADC and ENRI have been very helpful in this effort.

Please direct any questions to Mr. Brad Smith with our Anchorage office at (907) 271-5006.

Sincerely,

For Kaja Brix

P. Michael Payne
Assistant Regional Administrator
for Protected Resources

cc: Sal Cuccarese, ENRI
Michon Washington, FAA
Thomas Huynh, USAF

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668
December 15, 2000

Thomas Hyunh
Department of the Air Force
SMC/AXFV
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Dear Mr. Hyunh:

The National Marine Fisheries Service has reviewed the draft Environmental Assessment for the U.S. Air Force Quick Reaction Launch Vehicle (QRLV) Program, and offers the following comments:

Section 1.3. Scope.
Please discuss or clarify how this Assessment and program differs from the previous AIT program.

Section 4.4.1.3.2. Marine Mammals.
Unintentional harassment of marine mammals may occur during site clearance and security overflights using helicopters at low altitudes, or near marine mammal haul outs on Ugak Island. We recommend the launch operations procedures include specific instructions to security aircraft to maintain a minimum altitude of 1,000 feet when over water, and to remain at least one-half mile offshore of Ugak Island.

Section 4.4.1.5. Essential Fish Habitat.
The document concludes that impacts from any of the scenarios you describe would not be significant, or would be negligible. Therefore, it appears the Air Force has determined the proposed action would have no adverse effect on EFH. Pursuant to section 305(b)(2) of the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA) and according to 50 CFR 600.920(a) of the Interim Final Rule on EFH, Federal agencies must only consult with NMFS should any of the actions they authorize, fund, or undertake adversely affect EFH. If the Air Force determines the action would not adversely affect EFH, then it has no statutory obligation to consult pursuant to the MSFCMA. To avoid confusion, we recommend the EA use language which reflects that determination.

Section 4.4.1.5.2. Launch Failure or In-Flight Failure.
The rocket destruction process is not clearly defined in the EA. As marine mammals and their habitat are more concentrated in

shore areas, it would be beneficial to delay any abort command until the vehicle was well away from this area. To the extent that there may be any latitude in such a decision, we recommend the launch procedures consider this mitigating measure.

Section 4.4.1.3.2. Marine Mammals. Effects on hearing.
The discussion presented suggests launch noise levels are comparable to exposure levels that have been shown to be aversive to dolphins. We are uncertain if this accounts for the transmission loss from air into the water column, or if it assumes the cetacean would be at the surface during the exposure. That is, does this refer to *in-air* launch noise levels, and were the animals assumed to be at the surface during exposure, or are these resultant in-water levels being compared to data obtained from submerged animals?

P. 48. Behavioral effects.
The text states that whales are seen intermittently near Narrow Cape, and that they are not particularly dependent on resources in the immediate vicinity. While NMFS would generally agree with this assessment, we should note that some gray whales do remain in the area and may feed in nearshore waters. Little is actually know of their behavior in the Narrow Cape area, or their dependence on local resources.

Section 3.4.6.2. Whales.
The Kodiak community hosts a whale fest each April during the gray whale migration. This celebration is growing in popularity, and the Narrow Cape area is a prime whale viewing site during the spring migration. The EA should discuss how launch operations and access restrictions could impact this event.

Page 52. Behavioral effects, para. 3.
NMFS does not concur with the statement that an action which caused a sea lion to remain in the water would necessarily be an harassment taking under Federal law.

Page 53. para. 4.
The statement that any launch during May to July would result in significant impacts to harbor seals via breakage of the mother-pup bond should be qualified. The majority of seals haul out along the eastern shoreline of Ugak Island, away from the KLF. Received sound levels and other launch stimuli here would determine the level of affect a launch would have on these animals.

Finally, the EA should provide a statement as to whether the action is or is not likely to have significant adverse effects to the threatened or endangered species in the area, as the QRLV program is separate from the earlier AIT program, and therefore

requires separate consultation under the Endangered Species Act (ESA). Should you conclude the action is likely to adversely effect species, formal consultation would be required unless mitigative measures could be developed to remove this likelihood. Formal consultation would require the preparation of a biological opinion from NMFS; a process which may last approximately 180 days. If the action is not likely to adversely affect species or critical habitat, and NMFS concurs, consultation under the ESA is then completed.

Please direct any questions to Mr. Brad Smith in our Anchorage Field Office at (907) 271-5006.

Sincerely,

P. Michael Payne
Assistant Regional Administrator
for Protected Resources

MEMORANDUM

TO: File -QRLV EA

RE: Responses to NMFS letter of December 15, 2000

DATE: January 22, 2001

The following is provided in response to the above referenced letter from NMFS. Shown are the locations in the EA where we have responded to each of the NMFS comments. The order shown below is the same as in the NMFS letter dated December 15, 2000.

Section 1.3 - Scope

Based on reorganization of Chapter 1.0 of the EA, this is now Section 1.4. The following language has been added at the end of Section 1.4 (p. 5):

> A previous USAF program conducted from KLC was the *ait* Program. This action involved the launch of two different vehicles from KLC. The first vehicle (*ait*-1) was launched on November 5, 1998, and the second vehicle (*ait*-2) was launched on September 15, 1999.
>
> The proposed QRLV Program involves the launch of eight vehicles, with one launch per year beginning in 2001. The QRLV launches all are expected to occur between February 1 and April 30 of each year. The QRLV launch vehicles may be slightly smaller, or the same size as the *ait*-1 and *ait*-2 vehicles.

Section 4.4.1.3.2 - Marine Mammals

The following language has been added to Section 4.4.1.3.2 - Marine Mammals, under Pinnipeds, Behavioral effects (P. 59):

> As a result of ongoing interagency coordination, during preparation for a QRLV launch, the Range Safety organization (NAWCWPNS) has agreed to comply with the request of NMFS that its aircraft maintain a minimum altitude of 1,000 feet when over water and remain at least one-half mile offshore of Ugak Island. Due

to these procedures and because the QRLV launches will occur between February 1 and April 30, impacts related to mother-pup separation are not expected to result from the QRLV Program.

Section 4.4.1.5 - Essential Fish Habitat

The following language has been added to Section 4.4.1.5 - Essential Fish Habitat (p. 67):

As discussed in the sections that follow, impacts of the QRLV Program are not expected to result in significant impacts to EFH. Further, in the unlikely event of a launch failure, impacts would be highly localized. As a result, the USAF is not required to engage in formal consultation with NMFS, pursuant to MSFCMA.

Section 4.4.1.5.2 - Launch Failure or In-Flight Failure

The following language has been added to Section 2.1.6 - Range Safety (p. 24):

The NAWC will minimize near-shore destruct actions to the extent feasible by allowing an anomalous vehicle to continue to fly within the predetermined destruct corridor. However, due to prescribed safety constraints, if a vehicle crosses the predetermined destruct boundary, NAWC must terminate it immediately, regardless of its position relative to the shore.

The following language has been added to Section 4.4.1.5.2 - Launch Failure or In-Flight Failure (p. 69):

In response to ongoing interagency coordination, the Range Safety organization (NAWCWPNS) has agreed to comply with the desire of NMFS to minimize near-shore destruct actions to the extent feasible by allowing an anomalous vehicle to continue to fly within the predetermined destruct corridor (see Figure 4-1). However, due to prescribed safety constraints, if a vehicle crosses the predetermined destruct boundary, Range Safety must terminate it immediately, regardless of its position relative to the shore.

Section 4.4.1.3.2 - Marine Mammals

This section has been re-written, as follows (p. 55):

4.4.1.3.2 Marine Mammals

Cetaceans

Potential effects on cetaceans include: 1) effects on hearing, 2) significant changes in behavior, and 3) effects on feeding cetaceans in the event of a launch failure. Each of these is considered below.

***Effects on hearing*:** Research on auditory damage in marine mammals is still in its infancy; damage risk criteria have not been established for any species (NMFS, 1998). In addition, almost nothing is known about the auditory capabilities of baleen whales. However, even if filtering by the auditory system is not considered, peak noise levels produced by launches are comparable to exposure levels that have been tested in the bottlenose dolphin (*Tursiops truncatus)* (Ridgway et al., 1999), up to 192 dB (re 1 µPa) in water. While such levels were aversive to the dolphins, they produced no significant harm to their hearing. Baleen whales routinely produce such levels during social interactions (Richardson et al., 1995).

Marine mammals in water will be exposed to noise from rocket launches and sonic booms, particularly when the launch vehicle is directly overhead. Marine mammals receive their greatest noise exposure very close to the surface; at depth, noise levels decay rapidly, even when the sound contains significant low-frequency energy.

Depending on the angle of the launch vehicle, incident pressure at the surface of the water may be elevated by 6 dB due to reflection. Thus, if the worst-case exposure level immediately offshore of the launch site were estimated at 127 dB peak unweighted SPL (the level measured during the *ait*-2 launch just offshore of the launch site; Bowles, 2000a). A conservative estimate of the worst-case exposure can be obtained as follows: 127 + 6 = 133 dB peak SPL. This estimated level is within the range of worst-case exposures to thunder (peaks 120 to 140 dB peak sound pressure level [SPL]), to which animals may be exposed repeatedly as a storm front passes over (compared to a single exposure for a QRLV launch). Because sound levels in water and in air are referenced to different standard levels, 26 dB must be added to levels in air to obtain levels in water.

Thus, in-water peak SPL of the worst-case launch noise would be 127 + 6 + 26, or 159 dB SPL. At this level, bottlenose dolphins exhibit behavioral reactions, but do not exhibit distress or temporary threshold shift (TTS) (Ridgway et al., 1997). Although calls of baleen whales frequently exceed this level, it is close to their limit of tolerance to repeated exposures, such as seismic survey impulses (160 dB SPL; Richardson et al., 1995). In this case, the tolerance limit of whales is defined as the point at which 50 percent of a migrant population reacts with short-term avoidance (Richardson, et al., 1995). Based on this information, launch noise would not have an adverse effect on baleen whales, either above or below the surface of the water. Smaller cetaceans would be less sensitive, as their hearing at low frequencies is even less sensitive than the hearing of a pinniped.

At Ugak Island, launch noise reached 88.4 dB ASEL for the launch of *ait*-1 (the same launch vehicle as QRLV-3) (Stewart, 1999) and 92.2 dB ASEL for the launch of *ait*-2 (the same launch vehicle as QRLV-4) (Bowles, 2000a). Because the QRLV launch vehicles would be the same or smaller than *ait*-2, impacts from QRLV launches are expected to be the same or less than occurred with *ait*-2. Impacts from the QRLV Program would occur one time per year for a period of 8 years. Based on frequency and severity, potential impacts would not be significant.

P. 48 Behavioral Effects (This is Section 4.4.1.3.2 - Marine Mammals, under Cetaceans: Behavioral effects.)

The following language has been added in Section 4.4.1.3.2 - Marine Mammals, under Cetaceans: Behavioral effects (p. 56):

> It is recognized that gray whales have recently remained in the immediate vicinity of Narrow Cape outside the migratory period. It is not known whether this behavior will persist as the effects of the 1998-1999 El Nino decline.

Section 3.4.6.2 - Whales

This comment is addressed in Section 4.8, Socioeconomics, under 4.8.1 - Proposed Action. The suggested language has been added to this section, rather than to Section 3.4.6.2 - Whales, as the question relates to human activities.

The following language has been added (p. 82):

> The Kodiak community hosts a Whale Fest each April during the gray whale migration, and the Narrow Cape area is a prime whale viewing area during the spring migration. In preparation for a QRLV launch, the shoreline of Kodiak Island in the vicinity of KLC is planned to be closed to the public on the day of launch. It will be open the day before and the day following each launch. Although launch delays could result in additional closure of the KLC area, effects to the annual Whale Fest are expected to be minimal.

Page 52. Para 3. (See Section 4.4.1.3.2 - Marine Mammals, under Pinnipeds: Behavioral effects.

The following language has been added to Section 4.4.1.3.2 - Marine Mammals, under Pinnipeds: Behavioral effects (p. 58):

> If the sea lions were stimulated to enter the water or to remain in the water as a result of noise from a QRLV launch, it would not necessarily be a harassment taking under Federal law, and it would not necessarily mean the animals were harmed (NMFS, 2000; Appendix A).

Page 53. Para 4. (See Section 4.4.1.3.2 - Marine Mammals, Pinnipeds, Behavioral effects).

The following language has been added to Section 4.4.1.3.2 - Marine Mammals, under Pinnipeds, Behavioral effects (p. 59):

> However, because the QRLV launches will occur between February 1 and April 30, mother-pup separation is not expected to be associated with the QRLV Program. The majority of seals haul out along the eastern shoreline of Ugak Island, and Harbor seals pup on the southeast side of the island, away from KLC.

Final Comment (Section 4.4.1.4 - Sensitive Species)

The following language has been added in Section 4.4.1.4 - Sensitive Species (p. 60):

> The sensitive species addressed herein are the Steller's eider, short-tailed albatross, cetaceans and Steller sea lion. Essential fish habitat also is addressed. Based on the analyses, there would not be significant adverse effects to these species from either the proposed action or from the cumulative projects . Details are provided in the following sections.

APPENDIX B

COMMENTS AND RESPONSES TO DRAFT EA

QRLV DRAFT ENVIRONMENTAL ASSESSMENT
COMMENTS AND RESPONSES

The purpose of the Quick Reaction Launch Vehicle (QRLV) Environmental Assessment (EA) is to address the potential environmental impacts of the eight suborbital launches that comprise the QRLV Program. Only those questions pertaining to environmental issues have been addressed in this document. The non-environmental questions received have been forwarded to Space and Missile Systems Center/Public Affairs (SMC/PA).

Commenters may contact SMC/PA at the following:

By mail: 2420 Vela Way, Suite 1467, El Segundo, CA 90245-4659

By phone: 310.363.0030

Website: <www.losangeles.af.mil/>

CATALOG OF PUBLIC COMMENT LETTERS RECEIVED

Commenter	Date of Letter
Axell, Janet	12/01/00
Studebaker, Stacy	12/01/00
Studebaker, Stacy	11/30/00
Heitman, Carolyn	11/29/00
Axell, Janet	11/27/00
Heitman, Carolyn	11/27/00
Payne, Susan	11/27/00
Jones, Michael	11/21/00
Heitman, Carolyn	11/09/00

From: Cece Esparza [mailto:cece@ptialaska.net]
Sent: Friday, December 01, 2000 12:33 PM
To: thomas.huynh@losangeles.af.mil
Subject: QRLV EA

1 Dec. 2000

Thomas T. Huynh
2420 Vela Way, Suite 1467
El Segundo, Ca 90245-4659

Dear Mr. Huynh:

I am commenting on the Draft EA for the Air Force Quick Reaction Launch Vehicle Program.

Page 12, Table 2-2. Would you please explain what the various propellant classifications such as 1.1, 1.3C, etc. are and the meaning of the classifications. Also what do the various designations mean? **1**

Please explain what metals, substances, etc. are in the interstages of the multiple stage vehicles and the payloads. **2**

Are there any other radioactive materials, ionizing materials or other hazardous materials in the payloads or interstages or other parts of the missiles that have not been addressed? **3**

Please reply to the E-mail address below th indicate that you have received these comments. Thank you.

Janet Axell E-mail: cece@ptialaska.net

RESPONSES TO AXELL COMMENTS (12/01/00)

COMMENT #1

The explanation for the propellant classifications was provided in the Draft Environmental Assessment (EA), Section 2.1.2 - Launch Vehicles and Propellants.

COMMENT #2

The interstages of the multiple-stage vehicles are constructed primarily of aluminum and steel. The Quick Reaction Launch Vehicle (QRLV) payloads are constructed primarily of aluminum, steel, titanium and electronic components (e.g. ceramics, tin/lead solder, fiberglass, glasses, copper and silicon).

COMMENT #3

There are no radioactive materials or ionizing materials as part of the QRLV launch vehicle or its payloads. The solid propellant materials for each of the four potential QRLV vehicles were addressed in the Draft EA, Section 2.1.2 - Launch Vehicles and Propellants. Payload configurations and launch vehicles for the eight proposed QRLV launches will be determined as missions are required and funded, but they will not contain radioactive materials or ionizing materials. They will not contain hazardous materials other than battery materials (for example lithium oxyhalide and cobalt disulfide).

From: Stacy Studebaker [mailto:tidepool@ptialaska.net]
Sent: Friday, December 01, 2000 18:01
To: Thomas Huynh; John Edwards; Richard Williamson
Subject: Comments on Draft Environmental Assessment for Air Force Quick Reaction Launch Vehicle Program

Dear Gentlemen,

I have read the draft EA and here are my comments and questions. I did not get a reply to the questions I sent yesterday so I will include some of them in this document again. Also, since you have not interacted face to face with the public on your project, I don't think that 30 days is an adequate amount of time to respond to your EA. I will submit the first part of my comments today (Part I) and the rest (Part II) will follow next week.

Part I

There are two proposed projects mentioned in the EA, the Air Force's and the Army's. The title is very misleading because one would gather from it that this EA is ONLY for the Air Force's plan to launch one missile per year for the next 8 years. On page 43, sect. 4.1.2. the document states that "the Army will prepare an Environmental Assessment for its (STARS) program. If this is truly the case, why is it that the five additional Army launches per year have been incorporated into this document in all of the sections on CUMULATIVE IMPACTS? This is terribly misleading and ludicrous. The STARS missiles are an entirely different class of technology involving even more toxic, flammable and radioactive materials. It certainly appears from this document that the Army is trying to "piggy back" on this insubstantial EA in order to get away with not doing a more thorough EIS. Is this the intent? I learned last evening at the Army's public presentation in Kodiak that they will do a separate EA for STARS. However, the claims in your EA that, even with the additional 4 launches per year, there will be "no cumulative impacts" is in no way supported by any studies in your EA. **1**

However, I have to applaud the Army for coming to Kodiak and presenting the STARS program to our public in such a professional way. At least they are giving the public plenty of time to react to their proposal and prepare for their EA. I certainly can't say the same for the Air Force. There has been no equivalent Air Force presentation to the public. So, the NEPA process of involving the public has been blatantly side stepped by the Air Force. Why didn't you have a public presentation? Why were your ads and announcements "buried" in parts of the newspaper that few people read? You definitely have a public relations problem that only leads to more suspicion, distrust and lack of support from the public. AADC hasn't done any better. They are terribly evasive of the public and do not keep the Kodiak public informed. **2**

The military (of all nations, not just ours) are the worst polluters on Earth. Just our Island alone has over a dozen designated SuperFund Toxic Waste sites from WW2 that are being remedied by the Army Corps of Engineers. These sites do not include all of the toxic waste that was dumped in the ocean offshore of our island following WW2. The rest of Alaska has hundreds of Toxic waste sites resulting from military activity. **3**

Your claims of "no cumulative impacts" in all areas of concern do not take into account the existing historic military load of toxins on our land, air and ocean waters and bottom sediments. You (the military) must take responsibility for ALL of this toxic material, not just what you generate with your specific project. In your case, a few more rockets launched with their toxic exhausts and fall out, plus the rockets and boosters falling into the ocean are regarded as insignificant quantities to have any impacts. The idea that "dilution is the solution to pollution" seems to be your rule of thumb. This is a cavalier and false premise. Today, we in Kodiak and Alaska,as well as the rest of the nation experience the cumulative effects of historic and modern military activity in the form of increased rates of cancer, a multitude of other health disorders, not to mention the effects on the quality of air, water, food, other living things etc...The military has historically demonstrated its lack of responsibility by exposing humans to toxic and radioactive substances involved with testing weaponry and other war technology and denying and refusing to take responsibility for resulting health problems. So, your claims of no cumulative impacts on anything are false and not supported in your EA. There are NO in depth studies referred to in your EA regarding the exposure and effects of the specific chemicals in your program. **4**

Another area of concern which hasn't been addressed in any studies yet, is the specific geologic situation of Narrow Cape. Narrow Cape has many faults that are visible on land, from the air and walking along the beaches. In California and other states in the lower 48, an installation as big and as potentially volatile as the KLC would have had to have extensive geologic work done to ensure that the facility is built on geologically stable ground. Local geologist Dr.Gary Carver, says there are many faults crossing through the KLC but no work has been done to determine how historically active these faults are. This must be done in order to ensure the long term safety of a high risk facility involving storage of toxic, highly flammable and radioactive materials and protection of the environment and safety of people, not to mention the investment of millions of tax payers dollars. I demand a thorough geologic survey to determine the historic activity of these faults that will enable you to better predict and accommodate for future seismic activity. A good geologist, such as Dr. Carver, can do such work. **5**

The Whale section of your EA is a bit out of date. The concentration of Gray resident and migratory whales in Ugak and Pasagshak Bays has changed. You stated that other than peak migration times the whales are not immediately down range of your launches and therefore protected from falling debris. Last summer, an unusual feeding aggregation of between 200 and 400 gray whales were concentrated in a 20 mile X 20 mile area SE of Ugak Island. This group was feeding on the continental shelf and was verified by Sue Moore, a marine biologist with the NMFS Marine Mammal Lab of Seattle as well as Kate Wynne from the University of Alaska Sea Grant program. The Latitude and Longitude of the general location was: 57 degrees and 10 minutes North and 151 degrees and 47 minutes west. The whales occupied the same general area throughout the rest of the summer and even into October they were still feeding. This concentration of whales is unique and it is definitely in your trajectory path. Launches must take this aggregation of whales into consideration. Monitoring of whale behavior must be done before and during launches. Given the uniqueness of this **6**

aggregation of a once endangered species, you must devote more time and effort to understanding it, as well as changing your launch schedule so as to ensure minimal disruption from falling debris and sound.

You also stated in your EA that gray whales are bottom feeders. Given the concentration of feeding gray whales downwind of your launches, you need to do ocean bottom sampling now to establish a baseline of sediment composition. After launches, especially with the Army's thrown in, continual monitoring of bottom sediment quality must be done to ensure that gray whales are not feeding in a more and more polluted environment. This is the ONLY way that you can back up a claim that there will be no cumulative impacts on gray whales. Otherwise you must leave that claim out of your EA and move to an EIS. **7**

You also mention that your launches will be scheduled to occur between Feb.1 and April 30th. The peak of gray whale migration is early April through mid-April. Our WhaleFest program is scheduled for April 13 - 22 during which time many more people use the road to Narrow Cape and Fossil Beach to see the migrating whales. This is NOT an acceptable time to close the road for a launch. If you did, there would be a major community protest and probably a demonstration. Also, many visitors come to Kodiak for the WhaleFest specifically to see the multitude of gray whales passing by Narrow Cape. This has become a growing aspect of tourism at that time of year. To disrupt access and whale watching from Narrow Cape during that time would have consequences for and therefor impact on our economy. **8**

Another topic is transportation safety. You must transport highly toxic and flammable substances along our roadways to the KLC. AADC still hasn't developed a substantial safety plan to submit to the local Kodiak Emergency Planning committee. Given the roughness and narrowness of our roads, plus extreme bad weather conditions, more and very strict transportation safety procedures must be followed. Also, the public must be notified WHAT substances are being transported down our roads, WHEN they will be transported, and HOW they will be transported. This can be done by public announcements on our two radio stations, KMXT and KVOK as well as with ads in the Kodiak Daily Mirror. The public MUST be notified so as to ensure their safety on the road, and your safety. People go off that road all the time. Knowing that one of your vehicles is on the road on a certain day might make people more alert and avoid a possible collision/accident. **9**

RESPONSES TO STUDEBAKER COMMENTS (12/01/00)

COMMENT #1

It is correct that this Environmental Assessment (EA) was prepared specifically to address the U.S. Air Force (USAF) Quick Reaction Launch Vehicle (QRLV) Program, which involves the launch of one suborbital vehicle per year for a period of 8 years.

The QRLV Program is completely unrelated, and in no way preparatory, to STARS (U.S. Army North Pacific Targets Program). The U.S. Army is preparing a separate environmental document for its launch program. The commenter may request information regarding the North Pacific Targets Program by contacting Mr. Tom Craven:

By mail: U.S. Army Space and Missile Defense Command,
SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801

By facsimile: USASMDC SMDC-EN-V 256.955.5074

A web site with information about the North Pacific Targets Program is available at <www.huntsville.edaw.com/northpacific>.

The proposed USAF QRLV Program and the cumulative impacts of the QRLV, National Aeronautics and Space Administration (NASA) and U.S. Army launches addressed in this QRLV EA are within the parameters analyzed in the EA prepared by the Federal Aviation Administration (FAA) in 1996 for construction and operation of the Kodiak Launch Complex (KLC). That document is referenced herein as the FAA EA. The FAA EA analyzed up to nine launches per year of launch vehicles up to the size of LMLV-2 (Athena 2). The FAA issued a Finding of No Significant Impact (FONSI) based on the FAA EA completed in 1996.

COMMENT #2

The USAF has complied with the National Environmental Policy Act (NEPA) (42 USC 4321-4347, January 1, 1970, as amended), the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), Department of

Defense (DoD) Directive 5000.2-R (promulgated by 32 CFR 989), and USAF Instruction (AFI) 32-7061, which implements these regulations through the Environmental Impact Analysis Process (EIAP), for preparation of this EA.

The USAF notified the Kodiak Daily Mirror, the Anchorage Daily News and the Fairbanks News-Miner of preparation of the EA, availability of the Draft EA, the public comment period, and where to send comments on the Draft EA. The USAF is not responsible for the locations of its notices in the various newspapers; those decisions are made by the staff of each newspaper that publishes the notices.

The USAF sent a Public Notice to the Kodiak Daily Mirror notifying the public of the release and distribution of the Draft EA. The notice was published in the Kodiak Daily Mirror on November 2, 2000, and November 8, 2000.

The USAF sent a press release to the Anchorage Daily News and the Fairbanks News-Miner, dated November 20, 2000. The press release described the proposed project, notified readers of the availability of the Draft EA and provided details on the public comment period. An article by the Associated Press that described the proposed project and notified readers of the availability of the Draft EA was published in the Anchorage Daily News on November 22, 2000.

The Fairbanks News-Miner published an article on November 21, 2000, that described the proposed project and notified readers of the availability of the Draft EA, both electronically on a USAF web site and in hard copy at the Kodiak College Library, Kodiak High School Library and Kodiak Public Library.

The USAF also sent a Public Notice of the availability and comment period for the Draft EA to the Anchorage Daily News. The notice was published in the paper on Sunday, November 26, 2000.

The commenter is correct in stating that a Public Scoping Meeting was not held in Kodiak in conjunction with preparation of the Draft EA for the proposed USAF QRLV Program. Under NEPA Guidelines, Public Scoping is required prior to preparation of an Environmental Impact Statement (see Council on Environmental Quality Regulations for Implementing NEPA, Section 1501.7, Scoping). The regulations do not require Public Scoping prior to preparation of an EA.

COMMENT #3

Comment noted.

COMMENT #4

As discussed in EA Section 2.1.2 - Launch Vehicles and Propellants, a minimal amount of hazardous materials (some oily rags) are used at KLC in the pre-launch preparation for the QRLV Program. Any substances that are used or generated (primarily oily rags) are subsequently placed in sealed containers and removed from the premises. In addition, KLC and the USAF have safety, emergency response and spill plans in place for any accidental releases. Similar procedures were in place for the *ait* launches, although no pre-launch releases of toxic materials or cumulative impacts occurred.

Propellant materials to be used in the QRLV motors are listed in Table 2-2 of the EA, QRLV Launch Vehicles: Propellant Characteristics. To prevent or minimize the risk of accidents in transportation to KLC, the propellant-filled motors are handled according to Department of Transportation (DOT) procedures and a USAF transportation plan. With adherence to these procedures, the potential for even accidental exposure to the public is minimal, since the motors are handled only by trained personnel. There have been no isolated or cumulative impacts from the propellants used in the two previous USAF launches at KLC.

Since chlorine compounds, nitrogen oxides, aluminum oxide and carbon monoxide are generated as motor emissions from the solid rocket motors, the impacts from the two previous *ait* launches at KLC, as well as potential future emissions from the QRLV

vehicles, have been considered together in addressing cumulative impacts. In the EA, Section 4.2 - Geology and Soils and Section 4.3 - Water Resources describe monitoring by the University of Alaska, Anchorage, Environment and Natural Resources Institute (ENRI) before and after the previous launches. The monitoring results indicate that no lasting or cumulative impacts have occurred.

Because the QRLV launches are transient events that would occur only once each year, and the emissions would be rapidly dispersed (see Section 4.5 - Air Resources), there is no cumulative impact anticipated in the area of KLC or Alaska. Exposure guidelines for air emissions are presented for information purposes only in Section 4.5.1.1 - Lower Atmosphere Emissions and in the *ait* EA (USAF, 1997). During the QRLV launches, because the area will have been cleared according to safety procedures, there will be no public or launch personnel in the impact area downwind of the launch.

The general concerns expressed by the commenter regarding the existing military load of toxins on land, air and ocean waters; historic and modern military activities; and general health disorders, are noted. However, these are outside the scope of the QRLV EA.

With respect to cumulative impacts, see response to Comment #1.

COMMENT #5

Construction of KLC was addressed in the FAA EA completed in 1996 with a FONSI. Geology and soils were addressed in that EA. Concerns related to construction of the KLC are outside the scope of the QRLV EA.

COMMENT #6

The EA recognizes that gray whales have recently occupied the vicinity of Narrow Cape outside the migratory season (see EA Section 3.4.6.2 - Whales). It remains to be seen whether this pattern becomes typical now that the oceanographic patterns created by the 1998-2000 El Nino/La Nina cycle have begun to revert to normal. The wording of this section of the EA regarding feeding has been revised. However, aggregations of feeding

whales along the shelf-break would not be considered at-risk during a launch failure because, at that range, very little propellant would be available to enter the water.

COMMENT #7

Baseline monitoring in the marine environment for the products of a launch would not be productive. As stated in the EA, products released during a normal launch would be easiest to detect (but have not been detected) in streams and lakes, which are monitored after launches. As discussed in Section 2.1.2 - Launch Vehicles and Propellants, rocket propellant is imbedded in a binder matrix and would leach slowly into water only when deposited. Therefore, the risk to marine life is not from widespread leaching of chemicals but from ingestion of particles deposited on the bottom. Because these particles do not occur in nature, and because leached chemicals would only occur in trace quantities normally, baseline measurements would not be productive. Instead, cumulative effects would be best measured by sampling immediately after any launch failure.

COMMENT #8

The shoreline of Kodiak Island in the vicinity of KLC is planned to be closed to the public only on the day of launch. It will be open the day before and the day following each launch. Although launch delays could result in additional closures of the KLC area, effects to the annual Whale Fest are expected to be minimal.

COMMENT #9

The transport of launch vehicles and propellant is addressed in the EA in Section 2.1.4 - Vehicle Transport, Processing and Launch. The launch vehicles are described in EA Section 2.1.2 - Launch Vehicles and Propellants. As described, the four QRLV launch vehicle configurations will carry solid propellant that will have been installed in the motors prior to their transport to Kodiak. The motors will be transferred from Kodiak Airport to KLC in trailers designed specifically for each rocket motor.

The rocket motors are transported from the Kodiak Airport to KLC in accordance with DOT regulations. State and local authorities are notified in advance of the arrival of the

rocket motors. Additionally, all QRLV rocket motor arrivals into the Kodiak Airport will be scheduled to occur late in the evening, after the airport is closed to the public. Upon arrival, the rocket motors will be immediately offloaded and transported from the Kodiak Airport to KLC. Therefore, the transportation of the rocket motors to KLC will occur in the very early morning hours, when minimal traffic exists on the road.

From: Stacy Studebaker [mailto:tidepool@ptialaska.net]
Sent: Thursday, November 30, 2000 2:05 PM
To: Thomas Huynh
Subject: Questions on Kodiak Air Force EA

Dear Mr. Huynh,

In reading over the Draft Environmental Assessment for the U.S. Air Force Quick Reaction Launch Vehicle Program I have some questions that need to be answered BEFORE I can submit my comments.

There are 2 proposed projects mentioned in this EA, the Air Force's and the Army's. The title is very misleading because one would gather from it that this EA is ONLY for the Air Force's plan to launch one missile per year for the next 8 years. On Page 43 sect. 4.1.2. the document states that "the Army will prepare an Environmental Assessment for its (STARS) program. Is this true? When will this document be available to the public? **1**

Further into the document, it becomes apparent that the five additional U.S. Army launches per year have been incorporated into this document in all the sections on cumulative impacts. This is ludicrous. The STARS missiles are an entirely different class of technology involving even more toxic, highly flammable and radioactive substances. It certainly appears from this document that the Army is trying to "piggy back" on this insubstantial EA in order to get away with not doing a proper EIS. Is this the intent and will there or will there not be a separate document for the Army's STARS program? A full EIS must be done. The people of Kodiak deserve this. **2**

In addition, the only public involvement in any of the above so far is a meeting scheduled for this evening on the Army's project. This comes the day before the comments on the "Air Force" EA (which is trying to incorporate the Army's plan) are due. Do you think that this is adequate time and information for the public to become informed and comment on these two monumental and very different military projects? Once again, the Kodiak public have been kept in the dark and not adequately informed. **3**

I would appreciate your answers to my questions.

May I e-mail my comments on the EA to you or should I fax them?

Thank you.
Sincerely,
Stacy Studebaker
Kodiak, Alaska

RESPONSES TO STUDEBAKER COMMENTS (11/30/00)

COMMENT #1

It is correct that this Environmental Assessment (EA) was prepared specifically to address the U.S. Air Force (USAF) Quick Reaction Launch Vehicle (QRLV) Program, which involves the launch of one suborbital vehicle per year for a period of 8 years.

The QRLV Program is completely unrelated, and is in no way preparatory, to the STARS (U.S. Army North Pacific Targets) Program. The U.S. Army is preparing a separate environmental document for its launch program. It will be necessary to contact the U.S. Army in regard to schedule and availability of the U.S. Army environmental document. Contact Mr. Tom Craven:

By mail: U.S. Army Space and Missile Defense Command,
SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801

By facsimile: USASMDC SMDC-EN-V 256.955.5074

A web site with information about the North Pacific Targets Program is available at <www.huntsville.edaw.com/northpacific>.

COMMENT #2

This EA addresses the USAF QRLV program only. The EA includes the National Aeronautics and Space Administration (NASA) and U.S. Army launches only for cumulative impacts as required by the National Environmental Policy Act (NEPA) and by Council on Environmental Quality (CEQ) Regulations for Implementation of NEPA. The Army will prepare a separate NEPA document for its program.

Contact information for the Army project is provided in response to Comment #1.

COMMENT #3

There is no NEPA requirement to hold a Public Scoping meeting for an EA. All Kodiak residents were given the opportunity to comment on the Draft EA and Draft Finding of

No Significant Impact (FONSI). Copies of the Draft EA and Draft FONSI were made available at the Kodiak Public Library, Kodiak High School Library and Kodiak College Library. Public Notices were published in the Kodiak Daily Mirror. In response to requests of Kodiak residents, press releases also were issued to the Anchorage Daily News and Fairbanks News-Miner.

Also see response to Comment #1.

From: cheitman [mailto:cheitman@ptialaska.net]
Sent: Wednesday, November 29, 2000 8:26 PM
To: Thomas.Huynh@losangeles.af.mil
Subject: Draft Environmental Assesment for U.S. Air Force Quick Reaction Lauch Vehicle Program

Dear Mr. Huynh,
You should have received my comments on the AF QRLV Draft EA by EXPRESS MAIL this week. There were a couple of questions that I forgot to ask that I would like to have included with my previous comments.
(1) Will RADIOACTIVE THORIUM be used in ANY of the future AF (Navy TMD in reality) launches from Kodiak? 1
(2) Are there plans to relocate the road at Narrow Cape (where the Kodiak launch Complex is located)? 2

Finally, as an extremely concerned Kodiak resident, I am STRONGLY requesting that an EIS be done for the Quick Reaction Launch Vehicle Program, since the proposed Navy missile launches will be unrelated to the previous 2 ait launches and therefore requires an EIS. An EIS SHOULD have originally been done for the KLC rather than an EA. It is the right of the Kodiak public to request and have an EIS done. The time has come for one. The Navy and Army missile programs should not be piggy backing on the KLC EA. 3

Thank you.

Carolyn Heitman
P.O. Box 2303
Kodiak, Alaska 99615
(907) 486-5677

RESPONSES TO HEITMAN COMMENTS (11/29/00)

COMMENT #1

There will not be any radioactive materials used in any of the Quick Reaction Launch Vehicle (QRLV) or payload experiments.

COMMENT #2

The U.S. Air Force (USAF) QRLV Program does not have any plans or requirements to relocate any roads at Narrow Cape.

COMMENT #3

The proposed USAF QRLV Program and the cumulative impacts of the QRLV, National Aeronautics and Space Administration (NASA) and U.S. Army launches addressed in this QRLV Environmental Assessment (EA) are within the parameters analyzed in the EA prepared by the Federal Aviation Administration (FAA) in 1996 for construction and operation of the Kodiak Launch Complex (KLC). The FAA made a Finding of No Significant Impact (FONSI) following the FAA EA. As a result of the FONSI, an Environmental Impact Statement (EIS) was not required. This procedure is in accordance with National Environmental Policy Act (1969) (NEPA) and the Council on Environmental Quality (CEQ) Regulations implementing NEPA.

The USAF is unaware of any "proposed Navy missile launches." Comments on the U.S. Army North Pacific Targets Program should be addressed to the U.S. Army, Mr. Tom Craven:

By mail: U.S. Army Space and Missile Defense Command,
SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801

By facsimile: USASMDC SMDC-EN-V 256.955.5074

A web site with information about the North Pacific Targets Program is available at <www.huntsville.edaw.com/northpacific>. The U.S. Army is preparing a separate EA for that program.

Heitman 11/29/00

November 27, 2000

Janet Axell
P.O. Box 3895
Kodiak, AK. 99615

Thomas T. Huynh
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Dear Mr. Huynh:

I am commenting on the Draft Environmental Assessment for the U.S. Air Force QRLV program

In section 1.2 one of the objectives of the launch is to "provide a launch vehicle with an appropriate trajectory for the U.S. Navy Theater –Wide Program." Where do you establish the need for this program? What is the trajectory for the QRLV launches? Where would Navy ships be located that will be firing intercept missiles? What is the distance of the QRLV missile flights and of the intercept missiles? What intercept missiles would be used? All this is pertinent information to insure compliance with the INF and ABM 1

The Sept 29,2000, memorandum accompanying the Draft EA indicates launches are planned to occur during February through April time period. April is one of the peak migration months for the 25,000-28,000 gray whales that pass by the launch site very close to shore on their way north. In conjunction with this Kodiak has its annual WHALE FEST A Migration Celebration during the 1st or second week of April. During April and May many Kodiak residents and visitors flock to Narrow Cape to watch the whales since it is one of the best places to observe them. APRIL IS NOT AN ACCEPTABLE TIME to launch a rocket from KLC. In the previous EA for the USAF two AIT launches the USAF agreed to not launch "during the peak gray whale migration periods of April 01 through May 31 and November 01 through December 31." We will be contacting NMFS about this. 2

On page 38 the average peak db are given for a 30 sec. time period What is the actual peak db during the "average"? 3

Pg.42 Sec. 3 11.2 under Range Safety would you please state what firefighting crew will be used. 4

Page 43 sec 4.1 2you state QRLV is smaller than LMLV-2 as addressed in the previous FAA EA, so HCL deposits would be less Where is the comparison of fuel components to back this up? 5

Pg. 47 sec. 4.4.1.1.2 What information do you have regarding the noise possibly causing DEAFNESS (permanent auditory threshold shifts in your jargon) on the buffalo which could possibly be right next to the launch? 6

P.47 sec. 4.4.1.2 How would you "mitigate" Morbidity and mortality (death)effects to fish in lakes in the event of a launch failure? 7

P 49 It is stated that cetaceans are not particularly dependent on resources in the immediate vicinity. This statement is not accurate. Gray whales feed along the shoreline and seem to be changing their pattern by becoming residents in addition to being migrants. Other species of whales also frequent the area between Narrow Cape and Ugak Is. One would assume they are there to feed since summer is their feeding time. 8

P 50 It is stated that in the event of a launch failure whales would be protected from falling debris by Ugak Is. and distance. This statement makes no sense at all. Distance would depend totally on where the failure occurred and the Island couldn't protect them 9

P.53 What is the extent of seal pupping on Ugak Is. and when does this occur? 10

P 61 sec.4.4.1.6 Seals should also be included here. 11

P 62 How many versions of QRLV will be used? You mention QRLV-3and QRLV-4 Do you plan to launch others" 12

QRLV-4 contains 61% more propellant than QRLV-3 but you say concentrations of emissions will not necessarily increase by that amount due to combustion temperatures, prevailing winds and other factors. No, emissions might be more or less, but generally if you are burning 61% more fuel you get 61% MORE emissions. What is the need for this MISLEADING statement? 13

I ask you to please calculate the concentrations of emissions for the QRLV with the largest amount of propellant. Emissions calculations of QRLV-3 launches are NOT representative of a launch with 61% more propellant. 14

What does the following statement mean? "This will lower the gas phase concentrations, but also will reload ground deposition, which will reevaporate in several minutes, leaving downwind concentrations unchanged (USAF, 1997)." Clarify please. 15

P 64 sec. 4.5.2 Cumulative impacts given are misleading. You need to address more clearly the fact that each launch depletes the ozone for 3 years. If you launch one vehicle each year the yearly, effects to the ozone would be from 1 launch the first year, 2 the second year , three the third year and three each year thereafter. In addition you need to calculate the 61% greater emissions from the QRLV-4 or other launch vehicles which may be greater. Also the effects of 4 STARS launches per year are included in the cumulative effects. 16

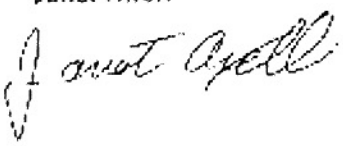
Just because the launches would contribute what you call a small % of AL203 and HCL to the stratosphere it is misleading to call it insignificant. We must remember the proverbial " straw that broke the camel's back." Do launch emissions affect the ionosphere at all? If so, how? 17

P 65 It states " The particles will participate in reactions that may cause ozone depletion during the limited time they stay in the stratosphere." The words "Limited time" is an attempt at minimizing the effects Considering the current state of depletion of the ozone layer we need to be cognizant of and taking measures to prevent further depletion of the ozone layer in every way we can. This is the precious layer that protects us from harmful radiation from the sun. You too live here. 18

Regarding cumulative effects, I ask that you include in your analysis how the AL2O3 and HCL combine with other substances introduced into the stratosphere by manufacturing and other pollution means. What other chemical reactions are likely to take place? 19

Thank you for the opportunity to comment on this draft EA.

Janet Axell



RESPONSES TO AXELL COMMENTS (11/27/00)

COMMENT #1

The need for the proposed Quick Reaction Launch Vehicle (QRLV) Program has been established by the U.S. Air Force (USAF). A discussion of need is provided in the Environmental Assessment (EA) in Section 1.2 - Need and Purpose for the Proposed Action.

The representative trajectory for the proposed launches is 120 degrees. A discussion of launch trajectory is provided in the EA in Section 2.1.5 - Launch Trajectory and Ranges. Graphic representations of the 120-degree launch trajectory are shown in Figures 2-7 and 2-8.

The use of the QRLV vehicles in support of the Navy Theater-Wide (NTW) Program will be for tracking purposes only. No plan exists to launch interceptors at the QRLV vehicles. If the possibility of launching interceptors arises in the future, a new and separate National Environmental Policy Act (NEPA) process will be initiated.

A discussion of the distances and flight paths of the four QRLV launch vehicles is provided in the EA in Section 2.1.5 - Launch Trajectory and Ranges. Graphic representations of the 120-degree launch trajectory (missile path) and distance for the QRLV vehicles are provided in the EA as Figures 2-7 and 2-8.

Public comments outside the purview of this EA are referred to Space and Missile Systems Center/Public Affairs (SMC/PA). The commenter may contact SMC/PA at the following:

By mail: 2420 Vela Way, Suite 1467, El Segundo, CA 90245
By phone: 310.363.0030
Website: <www.losangeles.af.mil/>

Axell 11/27/00

COMMENT #2

The shoreline of Kodiak Island in the vicinity of the Kodiak Launch Complex (KLC) is planned to be closed to the public only on the day of launch. It will be open the day before and the day following each launch. Although launch delays could result in additional closure of the KLC area, effects to the annual Whale Fest are expected to be minimal.

The commenter is correct that the Finding of No Significant Impact (FONSI) for the *ait* Program EA contained a statement that those two launches would not occur during peak gray whale season without prior consultation with the National Marine Fisheries Service (NMFS). The USAF continues to coordinate with NMFS concerning QRLV launches, including the schedule. Comments received from NMFS on the QRLV Draft EA are included in Appendix A of the EA.

Potential impacts to cetaceans as they relate to the QRLV Program are addressed in EA Section 4.4.1.3.2 - Marine Mammals.

COMMENT #3

In the EA, Section 3.6 - Noise addresses ambient noise, not average noise as stated in the comment. The discussion in the EA addresses ambient noise in the vicinity of the KLC on the day preceding the launch and day of the launch. Noise resulting from launch of the *ait*-1 and *ait*-2 vehicles is discussed under Chapter 4.0 - Environmental Consequences, in Section 4.6 - Noise. Results of the launch monitoring and noise measurements are reported in Section 4.6 as A-Weighted Sound Exposure Levels (ASEL).

The purpose of reporting sound exposure levels is to account for duration of the noise, which is not included in a peak level measurement. However, peak dBA values recorded for the *ait*-2 launch (which utilized the larger of the two *ait* vehicles) ranged from 101.5 dBA to 124.1 dBA at various monitoring sites. The 124.1 dBA level was recorded on Narrow Cape by an ENRI (University of Alaska, Anchorage, Environment and Natural

Resources Institute) instrument. Full details of these measurements are available in Bowles (2000), which was used in preparing the QRLV EA. The Bowles reference is available at <http://ax.laafb.af.mil/axf/>.

COMMENT #4

This will be a Kodiak Island public firefighting crew, which will be procured through a USAF contract. Additionally, a helicopter with a "honey bucket" for carrying water will be utilized for QRLV launches.

The above has been added to the EA in Section 3.11.2 - Range Safety Procedures.

COMMENT #5

The LMLV-2 was addressed in the previous Federal Aviation Administration (FAA) EA prepared for construction and operation of the KLC (FAA, 1996). This launch vehicle is shown in Figure 2-4 of this QRLV EA. As indicated in the figure (see Notes), the LMLV-2 is now designated as Athena-2, and is the largest vehicle that was analyzed in the FAA EA. Figure 2-4 shows that the 2-stage Athena-2 (formerly LMLV-2) includes two Castor 120 motors. These motors utilize a solid propellant comprised of ammonium perchlorate and aluminum powder in a hydroxyl-terminated polybutadiene binder. Each Castor 120 motor has a total 107,381 pounds of solid propellant. This compares to 22,268 pounds of propellant in a Castor IVA motor. Emissions for the Castor 120 are described in Table 4.2-1 and in the accompanying text of the FAA EA. For additional information, please see the FAA EA (FAA, 1996).

The approximately 215,000 thousand pounds of propellant carried by the LMLV-2 compares to the total 25,935 pounds of solid propellant carried by the largest of the QRLV vehicles (QRLV-4) in its two stages (see EA Table 2-2 - QRLV Launch Vehicles Propellant Characteristics). Based on the similarities in the two propellants and the fact that the propellant load for the Athena-2 is eight times the propellant load for the largest QRLV vehicle (QRLV-4), it is concluded that potential HCl deposits from the QRLV vehicles would be less than from the Athena-2.

Axell 11/27/00

COMMENT #6

In the EA, Section 3.7 - Land Use and Recreation notes that a ranch near the KLC offers for-fee bison (buffalo) hunting and horseback riding. Launch noise is not expected to adversely affect these animals. The brief noise peaks produced by the *ait* launches (the same launch vehicles as QRLV-3 and QRLV-4) were comparable to worst-case levels produced by thunder. There is no species known to be susceptible to hearing damage after exposure to noise levels produced by thunder. (See added text in EA Section 4.4.1.1.3 - Terrestrial Animals.)

A 7-foot chain link fence surrounds the Integration and Processing Facility and the Spacecraft Assembly and Transfer Facility, thereby preventing grazing animals from wandering into the launch area. The nearest game trail passes about 250 feet south of the launch stool location. As noted in EA Section 4.4.1.1.3 - Terrestrial Animals, "The brief noise peaks produced by the *ait* launches were comparable to worst-case levels produced by thunder. There are no species of mammals known to be susceptible to hearing damage after exposure to this common noise source."

COMMENT #7

East Twin Lake is artificially stocked with rainbow trout for public use by the Alaska Department of Fish and Game. The fish that are used to stock the lake are not native and are not protected. There are no endangered species of fish in the lakes. As a result, formal mitigation is not required. The text has been revised to eliminate reference to mitigation for fish mortality.

COMMENT #8

It is acknowledged that whales frequent the area between Narrow Cape and Ugak Island. Although they occur in this area, the area of potential impact is so small that such wide-ranging species would not be significantly affected even if they were permanently excluded from the area. No such long-term impact is expected. The whales are not restricted to the resources available in the area between Narrow Cape and Ugak Island,

and they are not restricted from feeding elsewhere. Because they are not limited to the resources in the vicinity of KLC, they are not considered dependent on these resources.

COMMENT #9

Comment accepted. This statement has been deleted from the EA.

COMMENT #10

The information available indicates that Steller sea lions do not pup on Ugak Island. Harbor seals pup on the southeast side of Ugak Island from the end of April to the end of June. This information is provided in EA Section 3.4.6.1 - Steller Sea Lion and Harbor Seal.

COMMENT #11

As stated in the EA, the bullet list, provided in Section 4.4.1.6 - Monitoring, reflects the monitoring tasks for biological resources that are required under terms of the Environmental Monitoring Plan (EMP) for KLC. This plan is an element of the licensing agreement between the FAA and Alaska Aerospace Development Corporation (AADC). The EMP was developed in coordination with the AADC, U.S. Fish and Wildlife Service (USFWS) and NMFS. It is not subject to revision by USAF. Please note that an additional item, "Environmental Quality," has been added to the bullet list in Section 4.4.1.6 of the EA. This element of the EMP requirements was inadvertently omitted from the Draft EA.

In addition to requirements of the EMP, the USAF also will monitor the QRLV launches, according to ongoing coordination with NMFS and USFWS.

COMMENT #12

One of four different launch vehicles (QRLV-1 through QRLV-4) may be used for each USAF launch of the QRLV Program. These four launch vehicles are described in the EA in Chapter 2.0 - Description of Proposed Action and Alternatives, Section 2.1.2 - Launch Vehicles and Propellants. The vehicles are depicted in Figure 2-4 - Comparison of

Launch Vehicles. For specific information on each launch vehicle, see the following sections of the EA:

- 2.1.2.1 -- QRLV-1 - Single-stage M-56
- 2.1.2.2 -- QRLV-2 - Single-stage SR-19
- 2.1.2.1 -- QRLV-3 - Two-stage SR-19/M-57
- 2.1.2.1 -- QRLV-4 - Two-stage Castor IVB/M-57

COMMENT #13

It is acknowledged that, in general, an increase in the amount of propellant used to fire a rocket motor in a launch vehicle would result in a subsequent increase in the concentrations of emissions at the exit plane of the rocket nozzle if the rocket motors were identical in combustion temperature, shape and other engineering parameters. However, due to differences in prevailing winds, humidity and other factors, downwind concentrations of pollutants will not necessarily increase linearly with an increase in the amount of propellant.

The EA has been revised to reflect that the discussion referenced in this comment addresses downwind concentrations of pollutants rather than nozzle exit plane concentrations of emissions. (Also see response to Comment #14, below.)

COMMENT #14

Based on the information provided in EA Chapter 2.0, including Table 2-2 and Figure 2-7, the two largest vehicles that would be launched under the QRLV Program are QRLV-3 and QRLV-4. The QRLV-3 is considered to be representative of the four potential QRLV configurations; it is smaller than QRLV-4 and larger than QRLV-1 and QRLV-2.

For QRLV-3, the maximum calculated downwind concentrations for all gas phase pollutants would be less than 0.05 parts per million (ppm), except HCl, for which one maximum case of 0.32 ppm was calculated. Details of this calculation are provided in the *ait* EA (USAF, 1997). The conservative statement in the QRLV Draft EA that HCl is less than 0.5 ppm corresponds to the estimate of 0.32 ppm. To bracket QRLV-4

emissions, let us assume a doubling of QRLV-3 emissions (that is, a 100 percent increase over QRLV-3 downwind concentrations). In that case, QRLV-4 downwind concentrations would be a maximum of 1.0 ppm.

The USAF Space Command Surgeon General's Office recommends an instantaneous maximum HCl exposure of no greater than 10 ppm to sensitive human populations. This is ten times the conservative estimate of maximum QRLV-4 emissions concentrations of 1.0 ppm. However, this exposure guideline is provided for information purposes only, since no human receptors live downwind of the KLC launch stool, and safety procedures ensure that no individuals are present in the safety exclusion area. Since the launch ground cloud is a transient event, long-term exposures are not a consideration. Similarly, by multiplying the calculated QRLV-3 concentrations for CO, NO and Cl_2 by 100 percent, we can estimate maximum QRLV-4 downwind concentrations to be less than 0.1 ppm, and for Al_2O_3 to be a maximum of less than 4 mg/m^3. These values are significantly below any applicable air quality or exposure standards.

COMMENT #15

Comment noted. The referenced statement has been revised to clarify the meaning in EA Section 4.5.1.1 - Lower Atmosphere Emissions to read as follows:

This will lower the gas-phase concentrations near the launch site.

COMMENT #16

It is acknowledged that each launch contributes to ozone depletion in the earth's atmosphere.

The cumulative effects of solid rocket motor launch vehicles on the stratospheric ozone was recently evaluated by Jackman, et al. (1998). The authors estimated a steady-state annual averaged total global ozone loss of 0.033 percent for a deposition of 1,941 tons of hydrogen chloride (HCI) and alumina (Al_2O_3) (from Shuttle and Titan IV launches) per year, over several years. This estimate corresponds to an annual average global ozone depletion of 1.7×10^{-5} percent per year per ton of HCI and Al_2O_3 emitted. In comparison,

a QRLV-3 vehicle would emit approximately 2,219 pounds of these substances at stratospheric altitudes. Since several QRLV launches (including the QRLV-1 launch) will emit less than QRLV-3, and some may emit more (if the QRLV-4 configuration is used), a conservative estimate uses 1 ton of emissions to the stratosphere per year for QRLV, which corresponds to a 1.8×10^{-5} percent per year average decrease in global ozone. The basis of determining this to be insignificant is comparison with mid-latitude annual global ozone losses, which average 3 to 7 percent. The QRLV contribution would be more than 5 orders of magnitude smaller (see USAF, March 2000; Jackman, et al., 1998). A discussion of global impact has been added under Section 4.5 - Air Resources, in Section 4.5.2 - Cumulative Impacts.

For information regarding stratospheric emissions from STARS launches, the commenter is referred to the U.S. Army, c/o Mr. Tom Craven:

By mail: U.S. Army Space and Missile Defense Command,
SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801
By facsimile: USASMDC SMDC-EN-V 256.955.5074

A web site with information about the North Pacific Targets Program is available at <www.huntsville.edaw.com/northpacific>. The U.S. Army is preparing a separate EA for that program.

COMMENT #17

See response to Comment #16.

The base of the ionosphere is generally considered to be approximately 70 kilometers above the earth's surface. The smallest of the QRLV vehicles would spend an estimated 4 minutes in the ionosphere; the largest would spend up to 17 minutes in the ionosphere. The gases emitted by these vehicles (such as water, CO, and HCl) would be decomposed or ionized by the sun's radiation and, due to the low density of all gases in the ionosphere,

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chemical reactions or changes to the composition of the atmosphere would be insignificant. There would be no impact on transmission of communications signals from the launches.

COMMENT #18

Comment noted.

COMMENT #19

The estimated global ozone depletion from all QRLV launches is compared to the average annual mid-latitude ozone depletion from total world-wide sources, which is 3 to 7 percent. The models for calculating stratospheric ozone depletion contain hundreds of chemical reactions, a relatively small number of which dominate stratospheric processes. These are described in detail in references such as Jackman et al., 1998.

Also see response to Comment #16.

November 27, 2000
P.O. Box 2303
Kodiak, Alaska

99615

SMC/AXFV
Attn: Thomas Huynh
2420 Vela Way, Suite 1467
El Segundo, CA. 90245-4659

Re: QRLV EA Program

Dear Mr. Huynh,

Here are my comments on the QRLV EA.

First, just for the record, *no* PUBLIC SCOPING MEETING has ever been held in Kodiak, Alaska before the QRLV EA and FONSI was completed. Kodiak residents were completely left out of the public comment process. As for the AF *ait* EA reference in the QRLV EA, the Air Force held Public Scoping Meetings on mainland Alaska, but never in Kodiak, in order to explain to the public the specifics of the *ait* program. This, first and foremost, should have been done since the *ait* launches took place from Kodiak Island and *not* from Fairbanks or Anchorage, Alaska where some of the public AF *ait* meetings were held. This action showed a total lack of regard and respect for the opinions of the Kodiak community and their right to participate in asking questions on the *ait* program.

(1) The EA does not list the specifics of the QRLV program, which will launch Navy TMD interceptors from the Kodiak Launch Complex (KLC) toward Kwajalein. Boosters launched from the KLC carrying various experimental tests for the NMD Program may possibly violate the ABM and INF Treaty and/or the 1997 ABM Demarcation Agreements for TMD tests. The amendments to the ABM treaty have *not* been submitted to the US Senate for ratification. **1**

(2) The EA does not address the issue of the INF Treaty restrictions in relationship to TMD interceptor launches from Kodiak Island toward Kwajalein. No EIS has been done for the Navy Theater-Wide Program. **2**

(3) The EA does not list detailed TMD intercept scenarios from Kodiak Island for future intercept at Kwajalein. The ABM Treaty restricts testing of NMD systems to Kwajalein and White Sands Missile Ranges.
The ABM Treaty prohibits the deployment of any national territorial missile defense or the development of any sea-or-space-based national missile defense, which is exactly what the QRLV EA proposes to do by launching missiles for the Navy's Theater Missile Defense as listed on **PAGE 22, Section 2.2.2.** Again, no EIS has been done for the Navy's Theater-Wide Missile Defense Program, so there is no justification for selecting Kodiak as a Navy missile target launch site until an TMD EIS is completed. **3**

On September 8, 2000, The Honorable Philip Coyle, Director Operational Test and Evaluation, made this statement: **"**Any NMD test activity must be sufficiently well defined in order to properly assess the ABM Treaty implication**"**.
The QRLV Program EA is **not** sufficiently defined in relationship to the ABM Treaty, the INF Treaty, nor the Navy TMD program. Any proposed launches of the Navy Theater-Wide System should be analyzed as part of an EIS for the system before the decision is made to incorporate additional missile target launch site locations.

(4) Page 4 of the EA states that no specific permits or approvals are required for the QRLV Program, as it is within the parameters evaluated in the FAA EA and the AIT EA. My reply is, the FAA and the AIT EA are not sufficiently defined in relationship to the ABM or INF Treaty. Since there is a Memorandum of Agreement between the FAA, DOD, and NASA for interactions with commercial launch sites, the FAA is **4**

not an impartial participant in the QRLV Program, which is a **DOD** program, not a *commercial* one. The FAA has no right to be promoting DOD activities, since one of its jobs is to protect the public's interest from any activity that could cause possible detrimental harm.

(5) The EA does not list the specifics of the proposed booster stage experiments or new technology testing from the KLC. Nor does it specify what defense contractor(s) designed the proposed booster experiments *and* whether or not, there will be hazardous or radioactive metals used in the experiments, such as radioactive thorium or magnesium, which have been launched on other Navy booster stages. There is no discussion of what will be used for the weight of the boosters, such as *depleted uranium*. This subject needs addressing. 5

(6) Section 2.1.2 does not explain why a portable launch stool will be brought to the KLC when there is an expensive payload launch pad and tower available and ready for use. Will rocket/missile launch propellants be so toxic and corrosive that they would cause damage to the launch tower structure? If that is the reason for bringing in a portable launch stool, then the proposed missiles and their caustic contaminants will certainly be a potential environmental hazard to Kodiak. This issue *needs* to be addressed in the final EA. 6

(7) Section 2.1.3 PAYLOADS: Kodiak Island residents deserve to know *exactly* what type of Army experimental missions will be launched from the KLC, since the Air Force purportedly does not know, but refers to them in this EA. The public cannot comment on this EA on *unknown* future booster experiments, which *may* or *may not* contain highly hazardous and/or radioactive materials or metals. Neither does this section specify if the proposed Air Force launches are preparatory for the future Army STARS launches from Kodiak Island; which in fact, it appears they will be. 7

(8) Section 3.11.2 RANGE SAFETY, does not specify if the USAF will deploy *special* fire fighting equipment necessary to extinguish explosive propellants. 8

(9) No detailed information is given concerning the reliability and safety of the rocket motors, or the mention of proposed testing of new, liquid fuel propellants such as *Hydrogen Peroxide* (which is planned for future launches at the KLC). 9

(10) EA does not address the issue of the long-term accumulative impact to Kodiak Island's environment or to the commercial fishing industry, caused by the number of Air Force, Army, Navy and NASA future proposed launches. Since an EIS was never done for the KLC, this QRLV EA cannot project the impact of all future launches by the two previous *ait* launches only. Common sense tells the public that 9 launches and possibly more over a period of 10 years, will have a *major* detrimental impact to Kodiak's environment. HCl from launches stays up in the atmosphere for a period of up to 3 years before settling down to the ground and is a **major factor** in global warming and pollution (this fact is from the DOD's own research). 10

(11) In the 1992 PMRF STARS EIS, Poker Flats Research Range in Alaska was designated as a proposed target launch site. It was excluded because boosters launched from the site carrying test objects to the target area near USAKA, would fall under the provisions of the START Treaty. The KLC, although near water, should also be excluded as a target launch location because of the same exclusionary criteria under the START Treaty. 11

(12) **Section 8.0 page 86, REFERENCES and RESOURCES,** lists the U.S. Army's *North Pacific Targets Program Draft EA* as a reference for the QRLV EA. The *North Pacific Targets Program is the* Army's *STARS* Program being proposed for the KLC. Although an Army *Public Informational Session* is being held in Kodiak, Alaska on November 30, 2000, the North Pacific Targets Program Draft EA jumped the gun, as did the Air Force, by using the QRLV EA as a reference. 12

considering the fact that the Kodiak public was not officially notified until November 22, 2000 that there was going to be a Army Public Informational Session in Kodiak. One can only concur that there was once again an attempt to exclude the Kodiak residents from participating in the EA comment process. These actions are deplorable and lead to public distrust of the DOD.

It is interesting how the BMDO incorporated Kodiak into a NMD missile launch test in July 2000, and the U.S. Army Space and Missile Defense Command completed the North Pacific Targets Program EA, Working Draft # 7 by August 31, 2000, *and* then the AF QRLV Draft EA completion followed on its heels by October 26, 2000. Both EAs were completed without notifying the Kodiak public until *after* the fact. What happened to public notification *before* the QRLV EA was printed? The Air Force evidentially had several months in which to prepare the EA, however, the public after the QRLV EA is said and done, is expected to read and have comments submitted within one month of notification.

(13) **Section 3.4.6 SPECIAL STATUS SPECIES**, states that there were no significant effects from the *ait* launches to special status species in the vicinity of the KLC. How exactly was that conclusion reached? The EA lists no details such as how many special status species were in the KLC vicinity *before* or *after* the *ait* launches. Since the video camera for the *ait* launches failed to pick up immediate behavior reaction of marine species upon launches, how can a conclusion be reached that the species suffered no ill effects from th two launches? Two launches should not be used as an example of all future launches. The more launches, the more detrimental effect there will be on marine species. **13**

Page 52 states that under normal circumstances and from a legal point of view, Sea Lions would have been harassed if the *ait* or *QRLV* launch stimulated them to enter the water. This conclusion is correct. The Kodiak public would be legally fined if anyone was caught harassing any marine species, under any circumstances, whether or not the species was listed as *special species* . Launching experimental missile tests from the KLC *will* be harassment and it is unacceptable.

Being that the Stellar Sea Lion is on the Endangered Species List (which outdates the original KLC EA), Kodiak Commercial Fishermen have been banned from fishing for certain fish species within 20 miles of Kodiak's shore, all the way down the Aleutian Chain. That being the situation, **no** DOD activity should be allowed to take place within that same 20 mile limit. The **QRLV EA** has not addressed this important issue, and it should do so in the **Final EA**. Since the 20 miles offshore limit restricts fishermen in their activity, the Air Force, Navy, Army and NASA should abide by the same restrictions in order to protect all *special species.*

(14) By the BMDO selecting the KLC as a NMD target missile launch site, the **QRLV EA** does not address the high risk issue to Kodiak Island by setting it up as a potential target site from *rogue nations*, as they are propagandistically called. The QRLV Program, Army STARS Program, Navy TMD, and NASA programs, are all programs for getting more DOD money to revitalized STAR WARS research . The *main* DOD objective being, **shooting missiles down with lasers**. **14**
The Kodiak public is not willing to have their island home included as a *guinea pig* test site for these kinds of DOD experimental programs.

Russian President Vladimir Putin has warned that any NMD program testing would trigger a new arms race. The QRLV Program is a phase of NMD testing whether or not the DOD admits to it.

(15) Another thing which is absent in the QRLV EA, is any reference whatsoever to the HF Electromagnetic missile detecting radar on Kodiak Island (located at Chiniak). This radar system has the ability to interfere with missile electronics and yet, any mention of it is *very obviously missing* in the EA. Is the reason because locating radars in Alaska for the purpose of NMD tests, also goes against the ABM Treaty? Please include reference to the **Kodiak HF Radar** in the **Final QRLV EA** and address its full purpose and capabilities. The Air Force Space and Missile Systems Center is very aware of the radar. **15**

(15) Since the QRLV EA omits serious issues and details concerning missile launch programs from the KLC, I am requesting the **NO ACTION ALTERNATIVE** for the QRLV Program EA, to insure that Kodiak Island's very fragile ecosystem will be left undisturbed from *any* DOD missile launch activity. 16

Please respond to my e-mail address below, so that I receive acknowledgement as soon as possible that this letter was received in your office. Thank you.

Carolyn Heitman
P.O. Box 2303
Kodiak, Alaska 99615

Carolyn Heitman

E-mail cheitman@ptialaska.net

Is the QRLV Program the one and same PicoSAT/Starshine spacecraft proposed for launch from the KLC in 2001? If so, why is there no mention of the spacecraft by name in this EA draft? The PicoSAT is described as a quick-reaction micro-satellite. Please address this 17

RESPONSES TO HEITMAN COMMENTS 11/27/00

COMMENT TO OPENING PARAGRAPH

There is no National Environmental Policy Act (NEPA) requirement to hold a Public Scoping meeting for an Environmental Assessment (EA).

The Quick Reaction Launch Vehicle (QRLV) Draft EA and Draft Finding of No Significant Impact (FONSI) were made available for public review. Specifically, residents of Kodiak and other areas of Alaska were given the opportunity to comment. Copies of the Draft EA and Draft FONSI were made available at the Kodiak Public Library, Kodiak High School Library and Kodiak College Library. Public Notices were published in the Kodiak Daily Mirror. In response to requests of Kodiak residents, notices also were provided to the Anchorage Daily News and Fairbanks News-Miner.

There were no Public Scoping meetings held for the U.S. Air Force (USAF) *atmospheric interceptor technology* (*ait*) Program, as there are no NEPA requirements for public meetings during preparation of an EA. As with the current QRLV EA process, there was a 30-day public comment period for the Draft *ait* EA; public concerns were addressed in the Final *ait* EA.

Under NEPA Guidelines, Public Scoping is required prior to preparation of an Environmental Impact Statement (EIS) (see Council on Environmental Quality Regulations for Implementing NEPA, Section 1501.7 Scoping). The regulations do not require Public Scoping prior to preparation of an EA.

COMMENT #1

The EA does list all the specifics of the QRLV Program. The QRLV Program involves the launch of one suborbital vehicle per year for a period of up to eight years.

No plan exists to launch interceptors at the QRLV vehicles. If the possibility of launching interceptors arises in the future, a new and separate NEPA process will be initiated.

The flight path of the USAF QRLV rockets is described in EA Section 2.1.5 - Launch Trajectory and Ranges. The representative 120-degree launch trajectory is shown in Figure 2-7 and Figure 2-8 of the EA.

Public comments outside the purview of this EA are referred to Space and Missile Systems Center/Public Affairs (SMC/PA). The commenter may contact SMC/PA at the following:

By mail: 2420 Vela Way, Suite 1467, El Segundo, CA 90245
By phone: 310.363.0030
Website: <www.losangeles.af.mil/>

COMMENT #2

There are no QRLV EA issues in this comment.

Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #3

The QRLV EA does not address intercept scenarios because no intercepts are planned.

Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #4

After coordination with the National Marine Fisheries Service (NMFS) and the U.S Fish and Wildlife Service (USFWS), there are no environmental permits currently required for the QRLV Program.

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Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #5

The payloads on the eight QRLV launches will vary between missions, although they will be similar to the experiments and tests described in Section 1.2 of the Draft EA. (Section 1.3 of Final EA.) The experiments include a Position Source Global Positioning System (GPS) experiment, two U.S. Army battery experiments, and a Space Integrated GPS missile guidance unit demonstration. The contractor(s) supplying the payload experiments will vary between missions.

There will not be any radioactive materials used in any of the QRLV vehicles or payload experiments.

COMMENT #6

The solid rocket motor propellant itself is not corrosive. The exhaust compounds for these types of propellants are addressed in EA Section 5.4.1.1 - Lower Atmosphere Emissions and Section 4.5.1.2 - Upper Atmosphere Emissions. The launch stool to be used for the QRLV Program is the same one that was approved and used for the USAF *ait* launches. The same type of solid rocket motor propellants that will be used with the QRLV vehicles will be used for vehicles that may utilize the launch tower for future commercial launches.

COMMENT #7

The U.S. Army battery experiments referenced in the QRLV EA are designed to test the flight durability of thermal (e.g., lithium oxyhalide) and chemical (e.g., cobalt disulfide) batteries. The components of the batteries used in these experiments will vary between missions (see response to Comment #5). If any of the future QRLV payload experiments have the potential to impact the environment beyond the scope of this EA, a supplemental NEPA process will be initiated.

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There will not be any radioactive materials used in any of the QRLV vehicles or payload experiments.

The QRLV Program is completely unrelated, and in no way preparatory, to the STARS (U.S. Army North Pacific Targets) Program.

COMMENT #8

The following text has been added to EA Section 3.11.2 - Range Safety for the purpose of providing additional information:

> *This will be a Kodiak Island public firefighting crew that will be procured through a USAF contract. Additionally, a helicopter with a "honey bucket" (for carrying water) will be utilized for QRLV launches.*

COMMENT #9

The launch success information in Section 2.1.4 – Vehicle Transport, Processing and Launch, has been changed to state the following:

> *The success rate since 1980 for all guided sounding rocket missions (the category that QRLV missions fall within) launched by the USAF Space and Missile Systems Center, Test and Evaluation Directorate (SMC/TE) is 92 percent. The SMC/TE was restructured in 1995, bringing the success rate for all launches since that time to 100 percent. The corresponding reliability (from a test set of 18/18 successful launches) has been calculated to be 95 percent. As a result, a launch failure related to the QRLV Program is unlikely.*

The QRLV vehicles will use only solid propellant. The components of the solid rocket motor propellant that will be used for each launch vehicle are shown in EA Table 2-2 - QRLV Launch Vehicles Propellant Characteristics. There will be no liquid propellant (i.e. hydrogen peroxide) rocket motors used with the QRLV launches. If any of the future QRLV missions will utilize motors not listed in this EA, a supplemental NEPA process will be initiated.

Heitman 11/27/00

COMMENT #10

The documents used as references in preparation of the QRLV EA include the EA originally prepared for construction and operation of KLC. The EA was completed by the Federal Aviation Administration (FAA) in 1996 (FAA EA). That document analyzed construction of Kodiak Launch Complex (KLC) and subsequent operation of the launch complex, including potential effects on the commercial fishing industry and cumulative impacts.

As stated in the FAA EA, the proposed action included operation of KLC, a commercial space launch facility. As stated in Section 2.1.3 of the FAA EA, those who utilize KLC as a launch site will transport launch vehicle components, payloads and associated parts, hardware and personnel to the site, conduct preparations for launch, and launch and track payloads into orbit. The number of launches per year would increase over a period of 22 years to a maximum of nine launches per year.

The FAA EA evaluated impacts based on the potential for up to nine launches per year of the LMLV-2 (now Athena-2), the largest vehicle that can be launched from KLC. The FAA EA concluded that environmental impacts from operation (up to nine launches per year for 22 years) of KLC would not be significant. The FAA issued a Finding of No Significant Impact (FONSI) based on the 1996 FAA EA.

Hydrogen chloride (HCl) is not classified as a greenhouse gas, and there are no Department of Defense (DoD) studies linking the compound to global warming, as implied in the comment. Section 4.5.1.1 - Lower Atmosphere Emissions and Section 4.5.1.2 - Upper Atmosphere Emissions of the EA address HCl emissions from the QRLV program.

Heitman 11/27/00

COMMENT #11

There are no QRLV EA issues in this comment.

Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #12

The U.S. Army North Pacific Targets Program EA was listed in error. Reference to it has been deleted from this EA in Chapter 8.0 - References and Resources. Information on that program can be obtained from Mr. Tom Craven:

By mail: U.S. Army Space and Missile Defense Command,
SMDC-EN-V, P.O. Box 1500, Huntsville, AL 35807-3801

By facsimile: USASMDC SMDC-EN-V 256.955.5074

A web site with information about the North Pacific Targets Program is available at <www.huntsville.edaw.com/northpacific>. The U.S. Army is preparing a separate EA for that program.

The USAF has complied with National Environmental Policy Act (NEPA) (42 USC 4321-4347, January 1, 1970, as amended), the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), DoD Directive 5000.2-R (promulgated by 32 CFR 989), and USAF Instruction (AFI) 32-7061, which implements these regulations through the Environmental Impact Analysis Process (EIAP), for preparation of this EA.

The USAF notified the public of the availability of the Draft EA and provided the public with the opportunity to comment. The USAF sent a Public Notice to the Kodiak Daily Mirror notifying the public of the release and distribution of the Draft EA. The announcement was published in the Kodiak Daily Mirror on November 2, 2000, and November 8, 2000.

Heitman 11/27/00

The USAF sent a press release to the Anchorage Daily News and the Fairbanks News-Miner, dated November 20, 2000. The press release described the proposed project, notified readers of the availability of the Draft EA and provided details on the public comment period. An article by the Associated Press that described the proposed project and notified readers of the availability of the Draft EA was published in the Anchorage Daily News on November 22, 2000.

The Fairbanks News-Miner published an article on November 21, 2000, that described the proposed project and notified readers of the availability of the Draft EA, both electronically on the Web and in hard copy at the Kodiak College Library, Kodiak High School Library and Kodiak Public Library.

The USAF also sent a Public Notice of the availability and comment period for the Draft EA to the Anchorage Daily News. The notice was published in the paper on Sunday, November 26, 2000.

An EA is considered "complete" and final only after it has been circulated for public review and comment. The 30-day comment period allotted for this EA is in compliance with requirements of NEPA.

COMMENT #13

The conclusion in the Draft EA that there were no significant effects to special status species as a result of the *ait* launches was based on the results of monitoring conducted by the University of Alaska, Anchorage, Environment and Natural Resources Institute (ENRI) and USAF at the time of the launches. The following references provide the methods and results of the monitoring and are cited in Chapter 8.0 - References of Resources. For completeness, these references have been added to the text of the Final EA, Section 3.4.6 - Special Status Species:

ENRI, 1999; Stewart, 1999; Bowles, 2000a; ENRI, 2000.

The Steller sea lion (*Eumetopias jubatus*) is addressed as a special status species in the FAA EA prepared in 1996 for construction and operation of KLC (FAA, 1996). At that time, the Steller sea lion was listed as a threatened species. The FAA EA states that the National Marine Fisheries Service (NMFS) had proposed to change the status of a portion of the Steller sea lion population (animals found in the Kodiak Island area) from threatened to endangered. Since the FAA EA (1996) and the USAF *ait* EA (1997) were prepared, both the FAA and USAF have coordinated with NMFS regarding the Steller sea lion, based on its listing as an Endangered Species.

As described in the EA, there is no direct evidence (no video) of the *ait*-2 launch stimulating Steller sea lions to enter the water. The reason for them doing so is not determined. As stated in Section 4.4.1.3.2 - Marine Mammals, Pinnipeds:

> *It was reported that many sea lions entered the water shortly before the video monitoring system failed at 9:30 a.m. on the day of the launch. The reason for this activity is not known.*

In a comment letter on the Draft EA (see Appendix A), NMFS did not concur with the statement that an action that caused a sea lion to remain in the water would necessarily be a harassment taking under federal law. Therefore, the text of the EA, Section 4.4.1.3.2 - Marine Mammals, under Pinnipeds, Behavioral effects, has been revised as follows:

> *If the sea lions were stimulated to enter the water or to remain in the water as a result of noise from a QRLV launch, it would not necessarily be a harassment taking under federal law, and it would not necessarily mean the animals were harmed.*

The comment regarding the ban on fishing has been noted as the opinion of the commenter.

Comment #14

There are no QRLV EA issues in this comment.

Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #15

There are no QRLV EA issues in this comment.

Public comments outside the purview of this EA are referred to SMC/PA. See response to Comment #1.

COMMENT #16

Comment noted.

COMMENT #17

The QRLV Program is not the same as, nor is it related to, the PICOSAT/STARSHINE spacecraft. The commenter may contact NASA in regard to the Kodiak Star Program:

Mr. George Diller 321.867.2468

For information about the NASA Kodiak Star Program, the commenter is referred to the NASA website: <www-pao.ksc.nasa.gov/kscpao/>.

Heitman 11/27/00

November 27, 2000

Thomas T. Huynh
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Dear Mr. Huynh:

These are my comments on the Draft Environmental Assessment for the QRLV Program being launched at the Kodiak Launch Complex.

You do not address the cumulative impacts from the launching of all the missiles that are being proposed for the Kodiak Launch Complex which have included the two AIT missiles, the Army's proposed STARS program, the NASA contracts that are pending, nor all the QRLV launches. The cumulative impacts are what will doom the Kodiak Island area and you need to address them. You will also be contributing to the significant ozone depletion that is underway. What percentage of depletion will this add? You state on page 25 that the soils have a low capacity to buffer pH changes. If this is so, then the soil will not be able to buffer the cumulative launch emissions of HCL and ALCl2. **1**

Page 8, paragraph 2: Please explain why the Airforce must use their own launching system at the KLC for the QRLV and AIT programs when there is a launch tower?. Are the propellants to corrosive? **2**

Section: 3.4.4 page 26: Your list of marine mammals does not include the Blue Whale and sei whales. There was a possible sighting of a Blue whale during the summer of 2000. National Marine Fisheries Service must study their use of the area in order for you not to include them as a possible species in the area. Sei whales are a frequent visitor on the West side of the island; they may be on the east side as well. **3**

The gray whales spring migration lasts up to 4 months starting at the end of March, and possibly continuing through July. Phenomenal numbers of gray whales can be seen throughout April and May. During this leg of the migration they pass just outside the kelp line all the way to Ugak Island. The northbound migration lasts two months probably from mid-October to mid-January. During the winter of 2000 the gray whale never left the Narrow Cape area. Beginning in 1999, they stayed throughout the summer and fall in the Narrow Cape area. They are definitely feeding in the area close to the surf line from fossil Beach towards Pashagshak Bay as well as offshore in the greater Ugak Bay area including outside of Ugak Island. The area may be an important resting and feeding area along the migration route, both southbound and northbound, as on occasion throughout the year there are "more whales than you can possibly count." Page 50 implies that chemicals on the bottom will not affect the gray whale because they feed only in Ugak Bay. Even if this was true, those **4**

chemicals will disperse throughout the area and with all the launches they will eventually add up and affect the prey of all species in the area.

In the 1997 U.S. AirForce Atmospheric Interceptor Technology Program Environmental Assessment Finding of No Significant Impact, the Airforce said, "In addition, the USAF will not conduct USAF ait launches during the peak gray whale migrating periods of April 01 through May 31 and November 01 through December 31 without prior consultation with, and approval by NMFS". This should apply to all launches from the Kodiak Launch complex. Because migration patterns have changed this should apply year around! **5**

The Narrow Cape area is important habitat for capelin, an Essential Fish Habitat species. Capelin, a forage fish of dietary importance to many marine mammals, fish and birds, including the Steller sealion, has been implicated in this species decline. These fish spawn on sandy beaches in the area, the latest sighting being from May, 2000. Offshore, a large biomass of capelin has been seen in this area during the 2000 surveys by the University of Alaska in Kodiak. **6**

The Steller sealions is an endangered species. Now fishermen cannot fish within a 20 mile radius of haul-outs and rookeries, and this includes Ugak Island. Explain why the launch programs at the Kodiak Launch Complex can proceed. In your EA, you have admitted "harassment" of the animals, which is the point of not allowing fishermen to fish. **7**

The "harassment" of the Steller sealion described on page 49 and 52, and the subsequent "rafting" of the animals makes them especially vulnerable to Killer whales. What about the effects on the Species of Special Concern Harbor seals? **8**

If the military does not have adequate studies on the auditory vulnerability of marine mammals, then you should take the time to research this subject before launching rockets and other activities. **9**

Socio economic impacts listed on page 39 do not mention the impacts to fishermen who will not be allowed to transit the Narrow Cape area during important and limited commercial fisheries openings. I include the following dates, but you need to check with the Alaska Department of Fish and Game and National Marine Fisheries Service to add to these times and fisheries: **10**

January 15: Kodiak Tanner Crab Fishery
April 15: Kodiak Commercial Sac-Roe Herring Fishery
June 9-October 31: Kodiak Commercial Salmon.

All the fisheries that I have listed are small boat fisheries that utilize the East side of the island. Transit is necessary for market reasons and for safety. The government, either the State of Alaska or the Federal Government, should pay the fishermen for the inconvenience and loss of income for not being allowed to transit during these fisheries. You have recognized that the seafood sector is the largest employer in the area so short delays could have enormous impacts not only on fishermen but cannery workers as well. I have not mentioned the charter fleet, which is now using this area for their operations. **11**

The fifth annual Whale Fest Kodiak will occur April 13-22, 2001. The growing community event is timed to correspond with the peak of the northboun gray whale migration, and it is drawing out of town visitors. Fossil Beach and the Narrow Cape area are the best viewing area for seeing the passing gray whales. You cannot launch rockets during this time without impacting our community! **12**

I look forward to reviewing the final EA and FONSI. Please send me a copy. Also, I understand that an EIS has not been completed on the Navy's Theater-Wide Program of which the QRLV program falls is part. I also request a copy of that document so that I can adequately assess both programs. Thank you. **13**

Sincerely,

Susan Payne
PO Box 1903
Kodiak, AK 99615

RESPONSES TO PAYNE COMMENTS (11/27/00)

COMMENT #1

The proposed U.S. Air Force (USAF) Quick Reaction Launch Vehicle (QRLV) Program and the cumulative impacts of the QRLV, National Aeronautics and Space Administration (NASA) and U.S. Army launches addressed in this QRLV Environmental Assessment (EA) are within the parameters analyzed in the EA prepared by the Federal Aviation Administration (FAA) in 1996 for construction and operation of the Kodiak Launch Complex (KLC), referenced herein as the FAA EA. Cumulative impacts for up to nine launches per year were addressed in the FAA EA for launch vehicles up to the size of the LMLV-2 (now known as the Athena-2). The FAA issued a Finding of No Significant Impact (FONSI) based on the analysis provided in the FAA EA.

The cumulative effects of solid rocket motor launch vehicles on stratospheric ozone was recently evaluated by Jackman, et al (1998). The authors estimated a steady-state annual averaged total ozone loss of 0.033 percent for a deposition of 1,941 tons of hydrogen chloride (HCl) and alumina (Al_2O_3) (from Shuttle and Titan IV launches) per year, over several years. This estimate corresponds to an annual average global ozone depletion of 1.7×10^{-5} percent per year per ton of HCl and Al_2O_3 emitted. In comparison, a QRLV-3 vehicle would emit approximately 2,219 pounds of these substances at stratospheric altitudes. Since several QRLV launches (including the QRLV-1 launch) will emit less than QRLV-3, and some may emit more (if the QRLV-4 configuration is used), a conservative estimate uses 1 ton of emissions to the stratosphere per year for QRLV, which corresponds to a 1.8×10^{-5} percent per year average decrease in global ozone. The basis of determining this to be insignificant is comparison with mid-latitude annual global ozone losses, which average 3 to 7 percent. The QRLV contribution would be more than 5 orders of magnitude smaller (see USAF, 2000; Jackman, et al., 1998). A discussion of global impact has been added under Section 4.5 - Air Resources in Section 4.5.2 - Cumulative Impacts.

Payne 11/27/00

The commenter's assertion that the EA states that "soils have a low capacity to buffer pH changes" is incorrect. The statement referenced by the commenter is found in Section 3.3 - Water Resources. The paragraph addresses water, not soils. It explains that water quality samples of the lakes and streams in the vicinity of KLC indicate "a low capacity to buffer pH changes, although adequate for maintaining pH at a neutral level."

Section 3.2 - Geology and Soils explains that the soils are acidic and have a relatively high cation exchange capacity. As a result, the KLC soils can buffer pH changes using cation exchange.

COMMENT #2

The solid rocket motor propellant itself is not corrosive. The exhaust compounds for these types of propellants are addressed in EA Section 5.4.1.1 - Lower Atmosphere Emissions and Section 4.5.1.2 - Upper Atmosphere Emissions. The launch stool to be used for the QRLV Program is the same one that was approved and used for the USAF *ait* launches. The same type of solid rocket motor propellants that will be used with the QRLV vehicles will be used for vehicles that may utilize the launch tower for future commercial launches.

COMMENT #3

The EA addresses species of cetaceans that are frequently sighted inshore along the coast of Kodiak Island (see Section 3.4.4 - Marine Mammals). Occasionally, individuals of a number of protected cetaceans found in the Gulf of Alaska wander inshore. The cetacean species addressed in the EA are normally found in shallow water off the east side of Kodiak Island. Species that include protected blue, sei and sperm whales, and many smaller odontocetes, including deep-diving beaked whales, have been found offshore or in other areas, but were not included in the EA because there is no reasonable mechanism by which they could be impacted by QRLV launches.

As discussed in the EA, sonic booms occurring offshore are not expected to be of sufficient level to cause hearing damage, even when whales are at the surface. Further,

dropping debris represents a vanishingly small hazard given the sparse and patchy distribution of whales at sea in deep water, the small chances of a launch failure, and the small amount of solid propellant remaining in the vehicle after the first minute of flight. That is why the EA focused on species likely to be found regularly in the immediate vicinity of the launch site.

COMMENT #4

As addressed in EA Section 3.4.6.2 - Whales and Section 4.4.1.3.2 - Marine Mammals, it is recognized that gray whales have recently remained in the immediate vicinity of Narrow Cape outside the migratory period. It is not known whether this behavior will persist as the effects of the 1998-1999 El Nino decline.

COMMENT #5

The commenter notes a statement in the FONSI for the USAF *ait* Program EA (USAF, 1997). That statement was in response to the specific parameters of the USAF *ait* Program and provided assurance that program managers would contact the National Marine Fisheries Service (NMFS) if launches were scheduled during the migratory period. In fact, for both *ait* launches, the USAF worked with NMFS regardless of the date of the launch.

The commenter is referred to the letter from NMFS (dated 12/14/00), which provides comments on the QRLV Draft EA. The letter is provided in Appendix A of this document.

COMMENT #6

The current National Oceanic and Atmospheric Administration (NOAA) Fisheries/Pacific States Marine Fisheries Counsel Essential Fish Habitat (EFH) designations do not consider individual forage fish species specifically (see <http://www.fakr.noaa.gov /efh/>; <http://www.fakr.noaa.gov/habitat/efhea/>), but rather designate habitat for them as a group. The area off Kodiak Island clearly represents essential habitat for many species. As a result, there are indeed large stocks of capelin, as well as many other

species in the area. However, as stated in EA Section 4.4.1.5 - Essential Fish Habitat, impacts of the QRLV Program are not expected to result in significant impacts to EFH. Further, in the unlikely event of a launch failure, impacts would be highly localized.

COMMENT #7

Based on a letter from NMFS to the USAF (December 15, 2000, provided in Appendix A), NMFS does not concur that an action that causes a sea lion to remain in the water would necessarily be a harassment taking under federal law. The EA has been revised accordingly.

Harassment effects are only likely to occur in the event the animals are approached frequently or for protracted periods, when they are attacked (e.g., with rifle shots), or if their food supply is impacted. These are the concerns that gave rise to the NMFS fishing guidelines.

COMMENT #8

Like many pinnipeds, Steller sea lions congregate in water when disturbed (rafting). They leave the "safety" of land to congregate in shallow water when they are disturbed (from sources either on land or at sea) for a good reason - water is the medium where they are best able to protect themselves, where they possess their greatest mobility; in water shallow enough to restrict the mobility of a predator; and in a group big enough to guarantee early detection and defense against a predator.

The spit at Ugak Island is frequently swamped by waves during high tides, which routinely makes the animals accessible to killer whales. However, killer whales are not known to linger in the area looking for sea lions, as subadult and adult Steller sea lions are formidable opponents and do not represent an easy or safe meal.

These statements are not meant to imply that Steller sea lions could never be taken by killer whales when rafting. Rather, that such an event would not be detectably more likely after a QRLV launch than under normal conditions.

Increased predation, as well as effects on the mother-pup bond, are possible during pupping. However, pinnipeds are not known to pup in the vicinity of Narrow Cape during the QRLV launch window (see EA Section 3.6.4.1 - Steller Sea Lion and Harbor Seal and Section 4.4.1.4.4 - Steller Sea Lions).

COMMENT #9

The information presented in the EA includes the recorded noise from two previous USAF launches (*ait*-1 and *ait*-2) where the two vehicles are the same as the largest launch vehicles that would be included in the QRLV launches (QRLV-3 and QRLV-4). In addition, responses of marine mammals in the vicinity, including Steller sea lions hauled out on Ugak Island, were observed and reported. Based on that information, it has been concluded that launch of one QRLV vehicle per year would not have a significant impact on marine mammals in the vicinity of KLC, including those that may be hauled out on Ugak Island. The report is available at <*www.http://ax.laafb.af.mil/axf*>.

COMMENT #10

Clearance of the Narrow Cape area for a QRLV launch will be temporary, occurring for only a few hours on the day of the launch. Fishermen will be advised in advance of pending closure(s) via a Notice to Mariners (NOMAR), so they can transit the closure area before the closure is placed in effect. Additionally, the onsite U.S. Coast Guard commander has the authority to allow fishing vessels to traverse the hazard area during the closure if it is deemed safe to do so.

In response to the comment, the following text has been added to Section 4.8 - Socioeconomics:

> *To ensure the safety of fishermen and other sea traffic operating off the coast of Kodiak Island during QRLV launches from KLC, preparatory to launches, a safety area will be established, within which risk to the public would exceed one in one million if sea traffic were present during a launch (FAA, 1996). This area will be cleared prior to launch. At completion of launch activities, sea traffic will*

be allowed to re-enter the area. This clearance will be temporary, occurring only on the day of the launch. As a result, impacts to commercial fishing and other boating activities would be minimal.

COMMENT #11

The area that will be closed to ensure the safety of ocean-going vessels is approximately as shown in Figure 4.4-1 of the Draft EA. As shown, this area is relatively small compared to the entire area available for fishing and boating activities.

Also see response to Comment #10, above.

COMMENT #12

The shoreline of Kodiak Island in the vicinity of KLC is planned to be closed to the public only on the day of launch. It will be open the day before and the day following each launch. Although launch delays could result in additional closure of the KLC area, effects to the annual Whale Fest are expected to be minimal.

Also see responses to Comments # 10 and #11, above.

COMMENT #13

The Final QRLV EA will be sent to the commenter. It also will be available electronically and in selected libraries and other locations. Persons who commented on the Draft QRLV EA will be notified. The USAF has no authority over documents prepared by other branches of the U.S. military.

The commenter may contact the U.S. Navy in regard to the Navy Theater-Wide Program via Capt. Christopher J. Taylor, TAMD/SE Public Affairs Officer, as follows:

By mail: 2531 Jefferson Davis Highway, Arlington, VA 22242-5170
By phone: 703.602.7144 Ext. 128
By e-mail: <taylorcj@navsea.navy.mil>

21 Nov. 2000

Thomas T. Huynh
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Mr. Huynh:

Here are my comments on the Draft Environmental Assessment for the U.S. Air Force Quick Reaction Launch Vehicle (QRLV) Program.

1) In section 1.2 it is stated that one of the objectives of the initial QRLV launch is to "provide a launch vehicle with an appropriate trajectory for the U.S. Navy Theater-Wide (NTW) Program." There is noway for the public to assess the need for such a target and possible alternative targets and launch sites because there is no Environmental Impact Statement for the NTW Program. **1**

2) On page 19 it is noted that since 1995 USAF has had 14 successful launches "since transferring to Kirtland Air Force Base" and concludes that a QRLV launch failure is "highly unlikely." This number of launches is too small to determine the failure rate very precisely. In addition, the weather conditions for these 14 launches were probably quite different from the likely conditions in Kodiak in February, March, and April. A more complete analysis of Minuteman II and III flight tests and launches of refurbished Minuteman I boosters indicates a rate of severe failures of about 15%. (See the analysis by David Wright submitted as a comment on the 1998 Theater Missile Defense Extended Test Range Supplemental EIS -- Eglin Gulf Test Range.) Based on a reliability of 85%, the probability of eight launches without a failure is only 27%. Unless more information and analysis are provided, it is not justified to assert that a QRLV launch failure is "highly unlikely." **2**

3) Section 2.2.2 on page 22 concludes that, "under the No Action Alternative, the Navy would not be able to analyze and test Aegis Theater Missile Defense (TMD) intercept scenarios for future intercept testing at the Pacific Missile Range Facility." No detailed information is given to support this conclusion. In fact, the 1998 Pacific Missile Range Facility Enhanced Capability EIS analyzed tests ofthe Navy Area TMD without mentioning QRLV launches from Kodiak. This EIS also claimed that the Navy Theater-Wide program "is not sufficiently developed to be included in this analysis." An EIS for the Navy Theater-Wide program has still not been done. Therefore, there are no existing environmental analyses that support the conclusion in section 2.2.2. Furthermore, the ranges of the QRLV and the trajectories illustrated in Fig. 2-8 appear to be inadequate for intercept tests associated with the Pacific Missile Range. **3**

Please reply to the address below and/or by E-mail to indicate that you received these comments. Thank you.

Michael Jones | phone 808 956-2932
Physics Dept. | FAX 808 956-2930
Univ. of Hawaii | E-mail mdj@phys.hawaii.edu
Honolulu, HI 96822

RESPONSES TO JONES COMMENTS (11/21/00)

COMMENT #1

Section 1.3 of the Environmental Assessment (EA), Need and Purpose for the Proposed Action, has been revised to state the following:

> *The primary objective of the QRLV launches is to provide realistic Theater Ballistic Missile scenarios in support of military exercises in the Alaskan Theater. The Alaskan Command (ALCOM), a joint DoD Command, will utilize the launches to exercise Ballistic Missile Warning and Battle Management, Command, Control and Communications (BMC^3) capabilities, test planning scenarios, and execute defensive strategies during actual ballistic missile flights. The only military exercise in the Alaskan Theater with the necessary resources and infrastructure able to meet the stated objective is the annual ALCOM Northern Edge Joint-Service training exercise.*
>
> *As secondary objectives, the first QRLV vehicle will host a wide sweep of experiments, including a Position Source Global Positioning System (GPS) experiment, two U.S. Army battery experiments, and a Space Integrated GPS missile guidance unit demonstration. Additionally, since the QRLV vehicles are able to provide appropriate trajectories for the U.S. Navy Theater-Wide (NTW) Program, the NTW Program Office will utilize the QRLV launches as windows of opportunity to exercise tracking capabilities and computer-simulated intercept scenarios.*

COMMENT #2

The launch success information in EA Section 2.1.4 – Vehicle Transport, Processing and Launch has been changed to state the following:

> *The success rate since 1980 for all guided sounding rocket missions (the category that QRLV missions fall within) launched by the USAF Space and Missile Systems Center, Test and Evaluation Directorate (SMC/TE) is 92 percent. The SMC/TE was restructured in 1995, bringing the success rate for all launches since that*

time to 100 percent. The corresponding reliability (from a test set of 18/18 successful launches) has been calculated to be 95 percent. As a result, a launch failure related to the QRLV Program is unlikely.

Appropriate steps have been taken to ensure that the winter weather in Kodiak will not have any adverse effect on the Quick Reaction Launch Vehicle (QRLV) launches. The launch vehicles are prepared in a mobile shelter. When a launch vehicle is exposed to the ambient environment, the vehicle temperature will be maintained within prescribed limits.

COMMENT #3

The statement in this comment has been deleted from the EA. The proposed QRLV Program will provide tracking missiles for the U.S. Navy Theater-Wide (NTW) program. The U.S. Air Force (USAF) QRLV Program does not involve intercept tests.

Section 2.2.2 – No Action Alternative, has been changed to state the following:

Under the No Action Alternative, the USAF QRLV Program would not be conducted. Impacts associated with the processing and launch of up to eight suborbital rockets would not occur. Additionally, under the No Action Alternative, the ability of the Alaskan Command (ALCOM) to prepare for and react to Theater Ballistic Missile threats would be diminished. The QRLV launches are the only realistic way to exercise Ballistic Missile Warning and Battle Management, Command, Control and Communications (BMC^3) capabilities, and test defensive planning strategies. Therefore, under the No Action Alternative, ALCOM would be unable to adequately train for Theater Ballistic Missile threats.

From: cheitman [mailto:cheitman@ptialaska.net]
Sent: Thursday, November 09, 2000 1:55 AM
To: thomas.huynh@losangeles.af.mil
Subject: Draft EA for Kodiak, Alaska

Dear Mr. Huynh,

Regarding the November 2, 2000 Public Notice in the Kodiak Daily Mirror concerning the Air Force Draft EA for the Quick Reaction Launch Vehicle (QRLV), is there a reason that a Public Notice was not also put in the Anchorage Daily News? The Anchorage Daily News has a large circulation in Alaska and is therefore read by many Alaskans and they should also have the chance to make their comments concerning the EA. Although the missiles may be launched from Kodiak, they also will be stored at Elmendorf AFB in Anchorage, which many Alaska residents are aware of. **1**

Also, why was there no Public Scoping Meeting in Kodiak before the recent Draft EA was done? Reviewing the EA, I found that much of the information was taken from the Kodiak Launch Complex EA from 1996, rather than a separate review being done. I recall that the Kodiak residents sent their comments to you on the 1996 EA and many felt that you did not take their comments seriously and proceeded with the KLC construction in spite of their disapproval. Out of respect to the Kodiak public, an Air Force representative should hold a PUBLIC SCOPING MEETING in Kodiak concerning this recent EA. A couple of public meetings were held in Kodiak for the KLC EA, so why not for this EA? I recall a Navy Official in Hawaii telling me a couple of years ago that if the Navy proposed to launch missiles from Kodiak as part of the TMD program, then a Public Scoping Meeting would be held in Kodiak FIRST. The recent Draft EA in question, discusses Navy TMD launches from Kodiak, and since your office is handling the EA, can you please tell me when Navy AND Air Force officials will hold a PUBLIC SCOPING MEETING in Kodiak???? The KLC EA has absolutely no mention of the future programs that are being proposed at this time to test phases of the NMD program; unless that is, the Kodiak residents were deceived when the KLC EA was printed(?) I would like to think not. **2**

Surely a person in your position realizes that Kodiak Island is not an approved site for testing missiles such as the two previous Air Force AIT launches from Kodiak, and that only Kwajalein Atoll is the approved location. The BMDO released that information, and that is why it did not want to participate in the two AF launches from Kodiak Island. There was the realization that the Air Force was proposing to use a radar in the tests that would have gone against the Anti-missile Treaty with Russia. I realize that the radar in question was not used in the AF AIT launches after all, but if it had been, the public would not have known about it. This is what leads to public mistrust. **3**

I would appreciate some information concerning the required PUBLIC SCOPING MEETINGS for the recent Draft EA and look forward to hearing from you as soon as possible before I send in my comments on the Draft EA. Thank you for your time. **4**

Sincerely,

Carolyn Heitman
Kodiak, Alaska

RESPONSES TO HEITMAN COMMENTS (11/09/00)

COMMENT #1

Based on this comment, the U.S. Air Force (USAF) sent a press release, dated November 20, 2000, to the Anchorage Daily News and the Fairbanks News-Miner. The press release briefly described the proposed project and notified readers of the availability of the Draft Environmental Assessment (EA) and provided details on the public comment period.

The USAF also sent a Public Notice of the availability and comment period for the Draft EA to the Anchorage Daily News. The notice was published in the paper on Sunday, November 26, 2000.

COMMENT #2

A Public Scoping Meeting was not held in Kodiak in conjunction with preparation of the Draft EA for the proposed USAF QRLV Program. Under National Environmental Policy Act (NEPA) Guidelines, Public Scoping is required prior to preparation of an Environmental Impact Statement (EIS) (see President's Council on Environmental Quality [CEQ] Regulations for Implementing NEPA, Section 1501.7 Scoping). The regulations do not require Public Scoping prior to preparation of an EA.

The USAF complied with NEPA (42 USC 4321-4347, January 1, 1970, as amended), CEQ regulations implementing NEPA (40 CFR 1500-1508), Department of Defense (DoD) Directive 5000.2-R (promulgated by 32 CFR 989), and USAF Instruction (AFI) 32-7061, which implements these regulations through the Environmental Impact Analysis Process (EIAP), for preparation of this EA.

The USAF notified the Kodiak Daily Mirror, the Anchorage Daily News and the Fairbanks News-Miner of preparation of the EA, availability of the Draft EA, the public comment period, and where to send comments on the Draft EA.

COMMENT #3

There are no QRLV environmental issues in this comment.

COMMENT #4

Public Scoping meetings are not required for the QRLV Program.

See response to Comment #2.

Heitman 11/09/00